2011
Department of
Plant & Soil Sciences
Periodic Program Review

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Department of Plant and Soil Sciences

Periodic Program Review Self-study

December 2011

Table of Contents

INTRODUCTION

The mission and vision of the Department of Plant and Soil Sciences are described in our strategic plan:

MISSION

- To improve, through scholarly research, the understanding of plant and soil systems as sustainable resources for human use while preserving and enhancing environmental quality.
- To recruit, educate, and graduate top-quality students and serve our broad-based clientele by providing progressive education programs and effectively interacting with partners in the public and private sectors.
- To anticipate and effectively respond to societal needs for improved agricultural productivity and for the wise use of natural resources in order to enhance the quality of life.

VISION

The department strives to balance the three mission areas of a land-grant institution: teaching, research and extension. We take seriously our role of responding promptly to agricultural and environmental issues. We address a broad subject matter including the chemistry, physics and biology of plant, soil and environmental systems ranging from the molecular, to the whole plant, to the ecosystem scale. The department works towards sustainable and profitable crop production, renewable resource management, and environmental protection for now and the future.

The department's strategic plan (Appendix 1) mirrors the University and college strategic plan.

OVERVIEW

The department is organized in three overlapping ways:

1) Mission areas – teaching, research and extension;
2) Graduate program discipline groups – Crop Science, Plant Physiology and Soil Science:
3) Commodity/resource committees – corn and soybean, forage, seed, small grain, soil, tobacco, turf, water/environment, weed.

Although there is some push-and-pull among groups in requests for filling faculty positions, with the overlapping departmental organizational structures the department has looked at the big picture and is supportive of maintaining our faculty needs to meet the traditional demands of crop agriculture and to provide the best research environment for each faculty member and each discipline group. This collegial approach has been an underpinning for the department, and will remain vital as changes in funding the public university system force the refashioning of our department.

The department is getting smaller. At our largest from 2000-2006 we had up to 54 faculty members, with up to 51 funded by UK. As of June 30, 2011 we had 47 faculty members with 40 funded by UK (Table 1).

Over the time period of the past two departmental reviews there has been a change in the Distribution of Effort structure within the department (Table 2). In 1998 the department was 30% extension. That has decreased to 19% in 2011. Some of that decrease was our deliberate decision to hire faculty extension specialists at 80/20 extension/research instead of 100% extension. As the research component recognized the considerable applied research conducted by our faculty extension specialists, this was more a definitional change than an extension program reduction. However since 2000 we have had a large series of retirements of our extension faculty, and since 2006 we have been slow to hire replacement faculty. Even though three of our last four faculty searches have been for extension faculty positions (water quality extension, soil/plant biochemistry research/instruction, soil management extension, turfgrass extension) our extension efforts have decreased and have also depended in part on fairly long post-retirement appointments.

Table 1. Faculty size for the Department of Plant and Soil Sciences 1997-2011. A faculty member who was 100% administration outside the department was not counted. A faculty member with any percentage of extension/instruction/research DOE in the department was counted. So these numbers indicate faculty member count, not faculty FTE. Post-retirement appointments are not reflected in the numbers.

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Adjunct	1	1	1	1	1	1	1	3	4	5	5	5	5	5	4
Extension	15	15	15	15	14	15	14	15	14	14	11	11	11	11	10
Research/Instruction	33	30	29	36	30	32	34	34	35	35	33	32	33	31	30
Research title						1	1					1	2	2	3
Total	49	46	45	52	45	49	50	52	53	54	49	49	51	49	47
UK funded	48	45	44	51	44	47	48	49	49	49	44	43	44	42	40

Table 2. Plant and Soil Sciences FTE Structure

1998						2008						2011					
	Res*	Ext	Instr	Adm	Total		Res	Ext	Instr	Adm	Total		Res	Ext	Instr	Adm	Total
Prof.	19.24	9.75	4.26	1	34.25	Prof.	12.75	4.15	2.25	1.8	20.95	Prof.	11.62	4.38	2.28	2.72	21.00
Assoc.	3.11	4.60	1.29		9.00	Assoc.	7.76	4.65	1.39		13.80	Assoc.	9.97	3.15	1.68	0.20	15.00
Assist.	4.10	0.0	0.90		5.00	Assist.	6.84	0.0	1.16		8.00	Assist.	5.53	0.80	0.67		7.00
Total	26.45	14.35	6.45	1	48.25	Total	27.35	8.80 †	4.80	1.8	42.75	Total	27.12	8.33 †	4.63	2.92	43.00
Percent	55	30	13	2		Percent	64	21	11	4		Percent	63	19	11	7	

*Research, Extension, Instruction, Administration

† post-retirement appointments, which are not indicated in the table, have and are contributing to our extension specialist efforts

The department is administered by the department chair. Mike Barrett returned to his research/instruction faculty role in June 2009 after serving as chair for 10 years. He was replaced by Todd Pfeiffer. The department appoints an extension coordinator, JD Green, and an instruction coordinator, David Williams. Research coordination falls on the directors of graduate studies, Mark Coyne – Soil Science, Dennis Egli – Crop Science, Art Hunt – Plant Physiology. As well the department appoints a promotion and evaluation committee. Faculty members are appointed to this committee for two year terms and may serve for up to four years. The departmental advisory committee consists of the coordinators, the directors of graduate studies, and the promotion and evaluation committee. When individuals are appointed to the department advisory committee they are appointed with consideration of: 1) the graduate program under which they would focus their research, 2) a balance of research, extension, and teaching missions, and 3) on-campus/off-campus location. The department chair relies heavily on the advisory committee for setting department priorities and direction. The department has multiple floating committees for various activities (visit http://www.ca.uky.edu/pss/internal/committee2011-2012.pdf), and all faculty members are appointed to at least one committee.

The department's budget (Table 3, for 2010-2011) has met the department's support needs, especially as the department retained salary savings from unfilled faculty lines. This will change in the 2011-2012 budget as the college has reclaimed those salary savings. The college has returned funds on a non-recurring basis to meet the previous commitments for post-retirement appointments, graduate research assistantships, etc. for which the use of the salary savings had been planned. The department has been in a beneficial position since 1999 in receiving nearly $300,000 in graduate student support funds under the Research Challenge Trust Fund. As the RCTF is state supported, these funds have declined in recent years as state support to UK has declined. Outside of salaries, the biggest operating budget expense for the department is our communications charges (Table 4). Each faculty member is given a small departmental allowance; this has varied from $1000 to $1500 the past three years to use for expenses not supportable from grant funds.

Table 3: 2010-2011 Departmental Budget					
	State	Federal	RCTF	Total	%
Faculty salaries (filled)	3,371,300	44,300	218,600	3,634,200	52.3
Faculty salaries (open)	422,000			422,000	6.1
Staff (inc. students)(filled)	1,411,300	734,300	294,100	2,439,700	35.1
Staff salaries (open)	16,300	104,700		121,000	1.7
Operating expenses	250,100	75,700	7,800	333,600	4.8
Total	5,471,000	959,000	520,500	6,950,500	
%	78.7	13.8	7.5		

Table 4: 2010-2011 operating budget		
Category	Amount	%
Communications (phone, internet, cell phone supplement)	88,100	26.4
Departmental allowance	81,000	24.3
In-state extension travel	27,000	8.1
Copiers	21,000	6.3
Office supplies	11,000	3.3
Maintenance	10,000	3.0
Department truck and van	6,400	1.9
Graduate student travel support	6,000	1.8
International programs (visa) fees	3,500	1.0
Office equipment maintenance	3,500	1.0
Background checks	2,000	0.6
Parking meters	1,200	0.4
Remainder	72,900	

The department has adequate space assigned or available (Table 5). The department has faculty members located in three buildings (Ag. Science North, Plant Science, Kentucky Tobacco Research and Development Center [KTRDC]) on the Lexington campus plus faculty at the Robinson Center for Appalachian Resource Sustainability in Quicksand, KY (Ditsch) and at the UK Research and Education Center in Princeton, KY (Bailey, Herbek [post-retirement], Lacefield [post-retirement appointment], Martin, Murdock, Ritchey). Although each office is small, the number of offices is adequate for faculty. While generally adequate, at times desk space is short for graduate students on specific floors of specific buildings. Most clerical staff and professional staff have individual offices. Most technical staff have desk space in their work area. Field and laboratory equipment is generally sufficient for research programs. Most of the equipment has been obtained through research/extension grant funds. The department does

not have dedicated classroom space. Most college classrooms have good IT capabilities but classroom furniture often does not allow for optimal student/teacher arrangements.

Table 5. Approximate office, laboratory, and field research space for the Department of Plant and Soil Sciences at Lexington, Princeton and Quicksand KY.

Location	Office	Conference	Lab	Greenhouse	Field
	sq ft				acre
AGN - Lexington	4200		13,900		
PSB - Lexington	7900	1300	19,900		
KTRDC - Lexington	2600	950	6800	4400	
Greenhouse/seedhouse - Lex	800		11,200	17,000	
North farm - Lexington				5,000	850
RCARS - Quicksand	200		2600		
UKREC - Princeton	1400		2600		120

The department was last reviewed in 2005. The recommendations from that review and the department's responses are attached (Appendix 2). The department accepted many of those recommendations and implemented changes to address those for which we could provide resources. Positive outcomes include strong relationships with FAPRU and KTRDC, adoption of the Integrated Plant and Soil Sciences graduate program, continued partial research appointments for extension faculty appointments, frequent consultation with the departmental advisory committee, regular department staff meetings, creation of a standing web committee and development of a robust departmental web site, and faculty leadership in developing regional research consortia for grant submissions. We did not progress on a review and strengthening of the undergraduate Horticulture, Plant and Soil Sciences program, increasing graduate student quality as measured by GRE scores, and defining the level of staffing required to meet extension programming needs.

EXTENSION PROGRAMS

The department has a historical pattern of staffing faculty extension positions by commodity/activity with an extension specialist for each activity at both Princeton and Lexington (Table 6). The exceptions have been a single turf specialist located at Lexington, a single agronomy specialist located at Quicksand, and, for a period of time, three tobacco specialists (two located at Lexington). The extension group has decreased due to retirements and recent appointments to administrative positions [Palmer (100%), Ditsch (75%), Murdock (50%)]. Although three of the last four faculty position searches have been for extension faculty the pace of refilling positions has not kept up with the retirements and exits. Extension activities have been maintained by the efforts of the current extension specialists and the willingness of retired extension specialists to serve in post-retirement appointments.

Table 6. Previous and current extension faculty specialist positions in the Department of Plant and Soil Sciences

Position	Location	2005	2011
Tobacco	Princeton	Bailey	Bailey
Tobacco	Lexington	Palmer	Denton (30% from TN)
Tobacco	Lexington	Pearce	Pearce
Forage	Princeton	Lacefield	Lacefield (post-retirement)
Forage	Lexington	Smith	Smith
Grain Crops	Princeton	Herbek	Herbek(post-retirement)
Grain crops	Lexington	C. Lee	C. Lee
Soil management	Princeton	Murdock	Murdock (50%)
Soil management	Lexington	Schwab	
Water quality	Lexington	Thom	B. Lee
Waste management/ soil management	Princeton	Rasnake	Ritchey
Turf	Lexington	Powell (post-retirement)	To be filled
Agronomy	Quicksand	Ditsch	Ditsch (25%)
Weeds	Princeton	Martin	Martin
Weeds	Lexington	Green	Green
Weeds	Lexington		Witt (50%)

As of July 1, 2011 the faculty extension DOE is at a low point of 19% of the department's faculty FTE. We need to address "Is the department continuing with a two specialist model for many of our extension specialist positions?"

The extension faculty members have remained very active in their programming activities. The reported extension contacts have remained constant between 2005 and 2010 (Table 7). The

number of extension publications, however, has decreased during that time. The extension programs have met the key indicators in our strategic plan (Appendix 3, Goal 5).

Table 7. Extension Publications, Contacts, and Activities						
	2005	2006	2007	2008	2009	2010
Reported extension contacts	56100	42200	53400	54200	83000	57700
Agent training participants						130
Extension publications		13	13	10	8	8
Extension grant proposals						27
County on-site research activities						57

The Plant and Soil Sciences extension programs are respected by the county agriculture agents in the state, one of the groups to which we point our efforts. Every two years the Associate Dean of Extension conducts a survey of county agriculture agents to measure their perception of extension program relevance to the county field staffs. The 2010 survey indicates that the extension specialists in the department are fulfilling that need (Table 8).

Table 8. 2010 Feedback on Extension Specialists by County Agents				
	Degree of Interaction	Overall Responsiveness	Value of Assistance	Effectiveness of Program
	3 Extensive 2 Moderate 1 Minimal	3 High 2 Moderate 1 Unresponsive	3 High 2 Moderate 1 Low	3 High 2 Moderate 1 Low
PSS specialists	2.28	2.87	2.85	2.84
CA specialists	2.05	2.81	2.80	2.78

A survey of Cooperative Extension Agents, Agricultural Commodity and Trade Organizations, and Agri-Industry Partners follows.

Assessment of Customer/Client Satisfaction with the services offered by the Plant and Soil Sciences Department at the University of Kentucky.

A survey was administered to three identified client groups to assess the degree of satisfaction with the services provided by the Plant and Soil Sciences Department. The client groups identified included Cooperative Extension Agents, Agricultural Commodity and Trade Organizations, and Agri-Industry Partners.

Question 1: How often do you interact with PSS Faculty or Staff?

Client Group	Total # of responses	Daily	Weekly	Monthly	Occasionally	Rarely	Never
			----------% of responses----------				
Agents	45	20.0	55.6	22.2	2.2	0.0	0.0
Organizations	15	0.0	13.3	40.0	33.3	6.7	6.7
Industry	12	0.0	33.3	58.3	8.3	0.0	0.0

Question 2: How would you describe the responsiveness PSS Faculty or Staff?

Client Group	Total # of responses	Aware of needs and respond proactively	Respond rapidly to indentified needs	Respond readily when requested	Respond reluctantly when requested	Do not Repsond
		----------% of responses----------				
Agents	45	46.7	44.4	8.9	0.0	0.0
Organizations	15	26.7	26.7	33.3	6.7	6.7
Industry	12	58.3	16.7	25.0	0.0	0.0

Question 3: Please indicate the quality of information provided by the PSS. Survey participants were asked to score each type of product/service on a scale where 1 indicated excellent quality and 4 indicated poor quality the results below indicate the average score (lower score indicated higher quality).

Client Group	Total # of responses	Written/printed publications	Websites Electronic Media	Educational Programs/Seminars	Individual Consultations
		----------Average quality score----------			
Agents	45	1.33	1.60	1.42	1.18
Organizations	15	1.69	2.00	1.86	1.69
Industry	12	1.50	1.91	1.82	1.25

Question #4: Overall how would you rate your level of satisfaction with the programs and services offered by PSS.

Client Group	Total # of responses	Very Satisfied	Satisfied	Somewhat Satisfied	Dissatisfied	
		----------Average quality score----------				
Agents	45	77.8	22.2	0.0	0.0	
Organizations	15	50.0	35.7	7.1	7.1	
Industry	12	66.7	16.7	16.7	0.0	

Survey participants were asked to add any comments or suggestions for improvements.

Among the agent group most the comments were very positive and encouraged the department to continue to provide a high level of service to agents including in-service opportunities and continued county programming support. One agent responded "We have one of the best Plant and Soil Science Departments in the Nation". Many of the Agent comments centered on maintaining the number of PSS extension specialists, given recent retirements and resignations.

Among the commodity organizations and trade groups comments included the suggestion that results need to be communicated quicker to growers. Provide "catchy" articles and keep the publications short. One respondent reported "we are to(sic) far west for any at UK, seems no one cares".

Among the industry group several comments were made indicating the need to speed the distribution of information to growers. One respondent commented "I think the University does good research, but they need to figure out ways of better distributing the results". Another stated "The department seems to be slightly behind the needs of the market at times". Positive comments included "Excellent support for the growers in KY and a very needed resource for others. Please keep this department strong for the future of agriculture in KY".

Overall the survey results indicated a high degree of satisfaction among the client groups surveyed.

Thumbnail sketches of individual extension programs are provided on the faculty CVs (Appendix 11).

RESEARCH PROGRAMS

The department devotes over 60% of our faculty time to our research mission. We publish close to 80 original refereed scientific articles per year, at approximately 3 articles per research FTE (Table 9). The faculty has been very successful at attracting research grant awards, averaging over 4 million dollars per year the last 5 years (~$100,000 per full time faculty member). With federal ARRA stimulus funds available last year the department was awarded over $7.5 million in support of research, with over $4 million in federally competitive awards. Patenting intellectual property arising from our research programs has not been a departmental priority, and patents have been granted in a slow but steady rate (Table 9). The College Research Productivity tables spanning 2004-2005 through 2009-2010 are attached in Appendix 5. Over those six reported years the department's research productivity was at the midpoint compared to the other departments in the college: averaging 7.5 out of 14 departments when ranked by grant $ per research FTE and 8 out of 14 departments when ranked by refereed publications per research FTE.

Research programs in Plant and Soil Sciences span a broad range of areas: from applied crop production to basic molecular biology, from nanoparticles to landscape analyses. This diverse research portfolio strengthens our department. It will underlay our new graduate program in Integrated Plant and Soil Sciences. On the other hand this research diversity limits our ability to discuss a common research theme. When the dean wrote that the college would be getting smaller, that meant the department would be getting smaller. Our breadth of research will be getting narrower. At times in the past we have discussed creating a more defined departmental focus. But research autonomy and the power of individual research ideas and objectives has always been our standard. As university funding for faculty positions decreases, we will again bump into the research autonomy/diversity vs. research focus/departmental strengths conundrum. The research focus comes into play when we consider adequate research synergism necessary for attractive graduate student education. Does one scientist in a research area make for a competitive graduate training program or do we need a core number? How do we define which research areas the department chooses to strengthen with upcoming faculty hires, and more contentiously which areas do not receive replacement faculty support?

Thumbnail sketches of individual research programs are provided on the faculty CVs (Appendix 11).

Table 9. Research productivity metrics for Department of Plant and Soil Sciences						
	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Full time faculty	44	41	41	40	43	
Research FTE	24.2	25.5	24.7	25.7	28.7	
Books and book chapters	6	4	12	10	2	
Refereed journal articles	78	69	70	85	77	
Books + book chap. + refereed art.	84	73	82	95	79	
Publication per research FTE	3.48	2.86	3.33	3.70	2.75	
Direct grant awards	$4,734,441	$2,080,714	$3,260,269	$3,920,885	$7,587,084	
Grant awards per full time faculty	$ 107,601	$ 50,749	$ 79,519	$ 98,022	$ 176,444	
Grant awards per research FTE	$ 196,043	$ 81,630	$ 132,209	$ 152,682	$ 264,082	
Federally competitive grant awards	$1,913,299	$ 509,077	$1,254,095	$2,183,972	$4,304,843	
% of grants federally competitive	40	24	38	56	57	
Collaborative grant awards	$8,924,135	$3,754,509	$5,396,895	$4,536,922	$8,751,893	
Patents	1	1	1	3	3	

TEACHING PROGRAMS

Faculty members in the department provide instructional time and leadership to multiple programs at both the undergraduate and graduate level (Table 10). While we participate actively in these programs, our FTE for instruction is less than 5 and our percent of effort for instruction is approximately 10% (Table 2). Note that the increase in administration FTE which occurred between 1998 and 2008 (Table 2) resulted from a formal acknowledgment of the administrative function for directors of graduate studies and directors of undergraduate studies. This carries through to 2011 in which 0.5 FTE for administration is divided among three DGS and two DUS.

The courses offered in the programs in which our faculty participates and those being taught by faculty members in the department are shown in Appendix 6. Student evaluations of courses in these programs as well as of the instruction by departmental faculty members indicate no deviance from the college and university means (Appendix 7).

Student diversity within our programs is shown in table 11.

Table 11. Student diversity for instructional program in which PSS faculty members participate. Data are for the 2009-2010 academic year.

Program	Number of students	Number of non-Caucasian students	Number of female students
ABT undergraduate	167	35	103
HPLS undergraduate	44	0	6
NRES undergraduate	65	1	24
Crop Science, Plant Physiology, Plant and Soil Science and Soil Science graduate programs – students with PSS advisor	62	24	24

Table 10. Education program metrics for Department of Plant and Soil Sciences						
	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Graduate Programs - Enrollment						
MS degree (Plant & Soil Science plus Crop Sci.)	24	23	24	29	20	23
Crop Science Ph.D.	14	10	13	12	14	11
Plant Physiology Ph.D.	18	22	2	17	19	20
Soil Science Ph.D.	11	11	12	8	9	12
Total	67	66	51	66	62	66
Undergraduate Programs - Enrollment						
Agricultural Biotechnology	164	165	167	174	167	131
Horticulture Plant and Soil Sciences	80	71	73	63	44	41
Natural Resources and Environmental Science	56	58	58	63	65	78
Sustainable Agriculture (Individualized prog.)						21
Total	300	294	298	300	276	267
Graduate Programs - Degrees						
MS degree (Plant & Soil Science plus Crop Sci.)	6	11	7	12	3	10
Crop Science Ph.D.	0	4	1	3	3	0
Plant Physiology Ph.D.	3	3	2	1	3	1
Soil Science Ph.D.	1	2	1	2	3	2
Total	10	20	11	18	12	13
Undergraduate Programs - Degrees						
Agricultural Biotechnology	26	29	32	15	29	18
Horticulture Plant and Soil Sciences	15	16	27	12	13	12
Natural Resources and Environmental Science	12	17	14	14	14	12
Sustainable Agriculture (Individualized prog.)						
Total	53	62	73	41	56	42

Undergraduate programs

The faculty teaches and provides leadership in formal interdisciplinary programs administered at the college level (Agricultural Biotechnology, Natural Resource and Environmental Sciences), the interdepartmental level (Horticulture, Plant and Soil Sciences), and a Sustainable Agriculture curriculum offered as an individualized program administered at the college level. The ABT program is a strong mature program with consistent enrollment and graduation records. The NRES program has experienced increased enrollment by 1/3 over the past 5 years, and graduation numbers should soon increase. The HPLS degree program continues its constant decline in enrollment and degrees. In the six year period of our previous review HPLS averaged 96 students enrolled and 21 degrees awarded per year vs. 62 students enrolled and 16 degrees awarded per year during the six years of this review period. Even if the SAG students are considered as a subset of students who would have previously enrolled in HPLS, the current enrollment level is low.

Members of the department have been active in creating, managing and partially staffing the World Food Issues track in the UK Honors Program. As well, the department has consistently provided instruction in the undergraduate courses (GEN 100, GEN 200) required at the college level for all CA majors (Appendix 6).

Student services, mainly provided by our participation in college efforts, are geared to meet the advising needs of our students.

Orientation

Orientation of undergraduate students occurs at the College level during summer advising and at the University level in the week immediately preceding Fall Term. There is not a separate departmental orientation. Faculty participate in teaching GEN 100 and GEN 200 (Issues in Agriculture), which are required courses for incoming freshmen (GEN 100) and transfer students (GEN 200).

Advising

Advising in the undergraduate programs is coordinated by the designated Directors of Undergraduate Studies for each major. The department does not maintain a single dedicated undergraduate advisor except for the turfgrass option in HPLS. In Agricultural Biotechnology a core of faculty serve as freshmen and sophomore advisors while other faculty members participate as research mentors for juniors and seniors. In HPLS and NRES students are assigned to individual faculty from a core advising group during orientation periods. Undergraduate faculty advisors routinely participate in semi-annual advising workshops sponsored by the College. Individual faculty members also participate in the UK Advising Network. Evidence of Quality Advising is reflected in the Ken Freedman Outstanding Advisor Award to David Williams (HPLS, Turfgrass option) for 2010.

Other Student Services Programs

The department maintains up-dated Web page highlighting accomplishments of previous graduates. Undergraduate student services also include maintaining separate clubs for turfgrass and agronomy with faculty sponsors. The department also sponsors a successful competitive

soil judging team. Faculty in the department are recruited to and act as faculty mentors for experiential education (PLS/NRE 399) and individual problem courses (PLS/NRE 395).

Graduate programs

Throughout this review period, and for many years previously, the department has participated in three PhD graduate programs (Crop Science, Plant Physiology, Soil Science) and the Plant and Soil Science MS graduate program. Members of the graduate faculties of these programs come from multiple departments, but the bulk of the students are advised by and supported by research assistantships from departmental faculty members. As a consequence the DGS for each of these programs is a departmental faculty member (Crop Science – Dennis Egli, Plant Physiology – Art Hunt, Soil Science – Mark Coyne, Plant and Soil Sciences – Dennis Egli). While the enrollment and degrees awarded across all these programs is strong and consistent, with the number of programs, the degrees awarded by any one program in a year are low (Table 10). These low numbers have been routinely scrutinized by the graduate school and the state's Council on Post-secondary Education. To answer this criticism regarding degrees awarded per program, the graduate faculties engaged in a decade long process of creating an integrated program, Integrated Plant and Soil Sciences (IPSS), at both the PhD and MS level. The number of degrees awarded by the integrated program will reflect the overall strength of the department's graduate student training. The proposal found at http://www.ca.uky.edu/pss/internal/archive/IPSS_Prog_2010_04_02.pdf has been approved, and the program will begin January 2012. No new students will be enrolled in the previous programs, but current students will finish in the program in which they originally enrolled.

A continuing quest has been to improve the GRE scores (as a metric of student quality collected by the graduate school) of our incoming graduate students. We have not achieved that quest (Table 12).

Table 12. GRE scores and percentiles of students who applied/enrolled Fall 2010

	Applied		Enrolled		Applied		Enrolled	
Program	Verbal	Verbal %	Verbal	Verbal %	Quant	Quant %	Quant	Quant %
AGR - MS	446	46	454	48	620	54	568	49
CRO - PhD	339	34	370	36	514	44	648	59
PPH - PhD	457	50	450	47	702	78	615	52
SOI - PhD	400	37	453	48	565	49	607	52

However, our graduate students publish at an acceptable and increasing rate (Table 13 and Appendix 8). We are focusing our students on publishing by adopting the guideline that one

publication should be submitted before a student sits for the thesis or dissertation defense. This guideline carries over to the IPSS program.

Table 13. Number of Refereed journal publications (since the previous review) by graduate students advised by faculty members in Plant and Soil Sciences

Publication Year	Number of Publications
2010	22*
2009	25
2008	27 (w/32 students)**
2007	16 (w/18 students)
2006	12 (w/13 students)

*average degrees awarded per year = 14
**There were a few publications with multiple student-authored citations. The total number of students is in parentheses.

The department has created programs to facilitate the transition of students into their graduate student coursework and research activities in Plant and Soil Sciences.

Orientation

The department has recently initiated an annual orientation session for all incoming graduate students in Fall Term. The department has also updated its *Guide to Graduate Studies*, which is now electronically available, http://www.ca.uky.edu/pss/academics/gradStudentHandbook2011July.pdf . Two new courses have been developed (IPS 610 and IPS 625) to acquaint in-coming students with the expectations of research productivity, communication, and interdisciplinary cooperation.

Advising

The department maintains a hierarchical structure for advising. Directors of Graduate Studies coordinate recruitment and admission of in-coming students, student evaluation, and adherence to Graduate School rules and regulations. Individual faculty members serve as major advisors and committee members and coordinate the academic and research efforts of students. The updated *Guide to Graduate Studies* clarifies rule changes at the Graduate School level for both students and faculty. Merging of the individual graduate programs in 2012 to form a single Integrated Plant and Soil Sciences Program (IPSS) will consolidate administrative recruitment and admission of graduate students.

Other Student Services

Directors of Graduate Studies facilitate the identification and nomination of graduate students for Scholarship and Fellowship awards. The department offers an annual award (Peaslee Award) for the outstanding graduate student in agronomy. The department also sponsors a distinguished alumni award and lecture to introduce graduate students to outstanding alumni. The department holds an annual Christmas Social and periodic picnics and coffee socials to which graduate students are encouraged to attend.

STUDENT LEARNING OUTCOMES

Horticulture, Plant and Soil Science Undergraduate Program
Programmatic Level Student Learning Outcomes

Technical Knowledge

1. Students will demonstrate proficiency in scientific principles of the plant, soil and environmental sciences and illustrate their interrelatedness.
2. Students will apply the basic technical principles of plant production and appraise their environmental and economic sustainability.

Professional Skills

3. Students will communicate clearly in oral and written formats.
4. Given a situation, students will define the problem, retrieve and evaluate information, and propose and evaluate potential solutions.

Perspective

5. -Students will examine the global diversity of our plant and soil resources.

Assessment Plan
Horticulture and Plant and Soil Sciences Undergraduate Program

I. Assessment strategies and processes

Programmatic assessment strategies and processes will be determined, instituted, and evaluated by an academic assessment committee. The committee for HPLS undergraduate programs shall initially consist of the chairs the departments of Horticulture and Plant and Soil Sciences, and the directors of undergraduate studies of the departments of Horticulture and Plant and Soil Sciences. In addition to these four individuals, the committee may seek input and participation from the faculty-at-large and also from offices both within and beyond the College of Agriculture as needed. As assessment needs and challenges change, the composition of the assessment committee will be evaluated and adjusted accordingly.

Programmatic assessment will be accomplished by the direct and indirect methods as indicated on the Assessment Inventory. Direct methods of assessment will include projects related to the capstone courses within areas of specialization. This will allow direct assessment of four programmatic learning outcomes through a semester-long project culminating in a term paper, oral presentation, or both. Learning outcomes 1-4 can be directly assessed by these projects, most especially L.O. #3. Additionally, a direct assessment of individual learning outcomes will be accomplished by a linear evaluation among appropriate courses within the curriculum for specific learning outcomes. These linear evaluations will include random collections of exams and other assignments from these and potentially other courses so as to allow for direct assessment of progress towards each learning outcome. Direct assessment will be accomplished by comparing student achievements as the expectations of the courses progress. For example, assessment of progress towards L.O.#3 will begin with evaluation student performance on written assignments and oral presentations in GEN 100, and then within one of several PLS courses at the 300 level or above (e.g., PLS 366) and culminating with

student achievement in the capstone courses. Clearly, the capstone courses are extremely useful vehicles for assessment of student preparedness in nearly all of our stated learning outcomes. We will rely heavily on capstone courses for assessments of reaching our learning outcomes. Examples of linear course evaluations include:

L.O.#1: PLS 220 ⟶ PLS 320 ⟶ PLS 514
L.O. #2: PLS 210 ⟶ PLS 386 ⟶ PLS 490
L.O. #3: GEN 100 ⟶ PLS XXX ⟶ PLS 490
L.O. #4: GEN 100 ⟶ PLS 366 ⟶ PLS 490
L.O. #5: PLS 104 ⟶ PLS 399 ⟶ Study Abroad (GEN 301, GEN 302)

Other direct methods of assessment will include publication of undergraduate student research and other documented undergraduate contributions to research (e.g., presentations of research, participation in student presentation competitions).

Indirect assessment will be accomplished by making better use of data from the College of Agriculture Office of Student Services. For example, our programmatic assessment committee will evaluate retention and graduation rate data and specific course evaluations. We will also take full advantage of the current efforts of the Student Services Office in indentifying at-risk students. The committee will request data from the office of experiential education regarding student performance during internships, and will use this data to evaluate preparedness of undergraduates for internship experiences. The committee will evaluate course syllabi on a regular schedule, re-evaluate the curriculum map, and propose curricular changes to the faculty based on these evaluations. The committee will compose a standard document which will be used to conduct exit interviews of graduating seniors. The exit interview will occur during the same semester as the capstone courses are taken and will be administered by the appropriate members of the assessment committee relative to areas of specialization within HPLS. The information gathered will be used by the committee as an indirect assessment of progress towards learning outcomes. The departments will continue to use peer evaluation of courses and instruction as a tool to improve teaching and learning. This will affect progress towards all learning outcomes. The committee would also like to institute a vehicle for tracking alumni successes. We do not currently have such a vehicle in place, but work towards this goal continues.

II. Assessment Cycle

For the next two years (2010-2012), the academic assessment committee will meet once per year in May at the end of the spring semester at a time agreed upon by all committee members. This will allow for evaluation of this new assessment plan. Adjustments to these processes and strategies will be evaluated and instituted where needed. Beginning in 2014, the committee will meet in May at the end of the spring semester of each even-numbered year for the purposes of evaluating the assessment process and programmatic progress towards meeting all of the stated learning outcomes.

III. Assessment Progress

Following the first round of instituting the assessment plan, it became clear that all data was fully subjective and also not a true assessment of achieving the stated learning outcomes. In an effort to work towards a viable improvement action plant, close examination of the model for assessment of graduate programs has been conducted. The graduate model includes an evaluation of each student immediately following thesis or dissertation defenses administered by the Director of Graduate Studies. This is an excellent tool for gathering quantitative data on student performance, especially from a logistical prospective. However, the data (evaluations) are purely subjective among graduate committee members, sometimes resulting in high variation within individual learning outcomes. Additionally, there are no similar opportunities in our undergraduate programs to conduct such evaluations as there are no defense meetings or committees.

One option under direct consideration is the institution of an exit exam for graduating seniors in HPLS undergraduate programs. The exam could be administered during each section of the capstone course (PLS 490) at the discretion of the instructor. The exam could be a direct measure of learning outcomes 1, 2, 4, and 5. Learning outcome 3 would continue to be evaluated by the already-instituted course projects in each section of the capstone course. Faculty within programs would contribute questions for the exam based on the stated learning outcomes. The exam would not contribute to or be any component of the course grade for the capstone course. Rather, it would used as a direct assessment of programmatic progress in achieving learning outcomes. Instructors of sections of the capstone course would provide the completed exams to the Director of Undergraduate Studies for grading and data compilation and analyses. The exam will provide purely objective data for assessment, and in conjunction with exit interviews, will provide a much more accurate and clear assessment of program strengths and weaknesses.

Assessment of Learning Outcomes of Graduate Programs

Learning Outcomes: Four learning outcomes of our graduate programs were identified by the graduate faculty. Components of these four learning outcomes are evident in the summary of assessments of learning outcomes taken soon after the final examinations of MS students in 2010-2011 (Table 1). There are eight equally ranked components in each learning outcome.

<u>At the completion of our graduate program students</u>:

1. Will have acquired an extensive knowledge of the sciences and technology that support research, education, and technological innovation in plant, soil, and environmental sciences. (Abbreviated as ‘Knowledge’).

2. Will be conversant with the literature, current concepts, and experimental and analytical methods that support research, teaching, and technological innovation in plant, soil, and environmental sciences, and in their application to agriculture and the environment. (Abbreviated as 'Skills').

3. Will have acquired skills in critical and analytical thinking and in communication skills that may be applied to research, education, industry, government, and public service. (Abbreviated as 'Communication').

4. Will have acquired those elements of professionalism necessary for rewarding and developing careers in plant, soil, and environmental sciences in research, education, production agriculture, agribusiness, government, and public service. (Abbreviated as 'Professionalism').

Assessment of Learning Outcomes:

Annual Assessment of Graduate Programs Graduate students are assessed by their advisory committees at the end of each academic year according to our assessment program and in compliance with Graduate School regulations. These regulations ensure that their advisory committee is functioning properly and that students are making good progress in their academics and research, and they warrant continued support (stipend, tuition and health benefits) if they are on graduate research assistantships and fellowships. The annual review of progress is a detailed process that incorporates the assessment of learning outcomes and uses the same rubric. These assessments are composited and incorporated in the assessment of the learning outcomes of the graduate programs.

Assessment of Graduate Programs after Completion of Qualifying Examinations: Graduate advisory committees are asked to complete an assessment rubric soon after the qualifying examination. The advisory committee is provided with a summary of the assessment of the student and others in his or her cohort. Data added to the database for overall assessment of the learning outcomes of graduate programs.

Assessment of Learning Outcomes soon after Final Examinations: Graduate advisory committees and the external examiner appointed by the Graduate School are asked to complete an assessment rubric soon after the qualifying examination. The advisory committee is provided

with a summary of the assessment of the student and others in his or her cohort. Data added to the database for overall assessment of the learning outcomes of graduate programs.

Assessment of Learning Outcomes from Graduates: We plan to ask recent graduates to re-assess the learning outcomes after five years. At present, we do not have a population of graduates to generate a database.

Assessment of Learning Outcomes in Integrated Plant and Soil Sciences: The procedures for assessment of learning outcomes have been adopted for our new graduate program (IPSS).

Conclusions

1. Assessments of learning outcomes under the auspices of the Office of Assessment are in compliance with the Office of Assessment and on schedule.
2. Assessment of progress of graduate students is in compliance with the Graduate School.
3. We anticipate more useful information as assessment is refined and database grows (Table 1).
4. Assessment of knowledge in field indicates effective teaching components; however, students are sufficiently aware of research publications and research institutions.
5. Assessment shows that graduates have satisfactory supporting skills.
6. Communication skills of graduates, primarily writing skills, needs reinforcement.
7. Research productivity of graduate students could be improved.
8. Variability among graduates is not as wide as expected (Table 2).

Table 1. Mean assessment of Learning Outcomes of ten MS students 2010-2011.

Learning outcome 1: Knowledge	Mean	sd
Basic interest in sciences.	85.2	11.3
Knowledge in fields of sciences that contribute to field of interest.	83.3	9.6
Knowledge of scientific literature in field of interest.	79.2	11.4
Knowledge of leading research institutions and researchers in field.	69.4	10.2
Knowledge of quantitative analysis: Statistics, spatial & temporal.	68.8	16.2
Understanding of molecular biology in agriculture.	65.3	9.0
Knowledge of environmental sciences in field of interest.	82.4	9.2
Basic knowledge of agriculture.	82.1	10.3
Learning outcome 2: Skills		
Knowledge and skills in field research.	88.4	11.4
Laboratory skills in field of interest.	78.3	9.4
Fundamentals of recording and documentation of data.	85.7	11.5
Knowledge and skills in experimental design and analysis.	71.0	15.3
Interpretation and critical analysis of research data.	70.9	11.5
Scale: Narrow through wide (molecular to landscape).	73.2	7.6
Familiarity with computer technology in the field of interest.	80.0	8.5
Knowledge and applications of internet in field of interest.	83.0	9.7
Learning outcome 3: Communications		
Evidence of creativity and innovation.	76.2	15.2
Conceptualization.	78.8	11.3
Action on ideas.	76.2	15.2
Skills in verbal communication.	84.8	15.9
Skills in written communication.	75.8	12.3
Experience in preparation of research publications.	68.1	7.4
Experience and ability in grant writing.	62.0	12.7
Experience and skills in teaching.	72.0	14.0
Learning outcome 4 : Professionalism		
Ethics: civics, citation protocols (*vis* plagiarism).	94.0	6.9
Attitude and bearing, interpersonal skills.	88.6	14.8
Work habits: punctuality, time management, etc.	85.2	18.0
Productivity: output.	73.6	9.1
Leadership and management potential: responsibility, etc.	77.4	15.9
Teamwork: attitude and potential.	87.0	13.7
Maturity.	84.4	13.1
Professional associations.	84.7	11.7

Table 2. Assessment of Learning Outcomes of MS Graduate Programs after Final Examinations in 2010 and 2011 by Advisory Committee Members.				
Learning Outcomes				
	Knowledge	Skills	Communications	Professionalism
Student	----------Percentage----------			
1	79.0	77.0	72.0	76.0
2	99.0	98.0	81.0	92.0
3	83.0	88.0	77.0	89.0
4	82.3	86.5	76.0	81.3
5	75.0	77.0	74.0	93.0
6	71.1	69.5	71.1	87.5
7	74.0	78.1	78.1	84.4
8	74.9	77.0	58.3	61.4
9	74.0	74.0	73.0	85.0
10	87.5	89.8	89.1	97.7
Ave	80.0	81.5	75.0	84.7
sd	8.4	8.7	7.9	10.3

FACULTY/STAFF

Our success and progress results from the success of our people: faculty, staff and students. The department is committed to creating an environment where differences are valued and all individuals have the opportunity to succeed, reaching their highest potential. To fulfill our mission, the department must be inclusive and responsive to the needs of all. The diversity among our employees generally matches the diversity within the college. Our diversity is greater among our graduate students and post-doctoral scholars than among our staff and faculty (Table 13). The expectation is that the greater diversity among our scientists-in-training will lead, over time, to an increasing diversity among our staff and faculty.

Table 13. Personnel diversity for employees in the Department of Plant and Soil Sciences, December 2009.

Program	Number of personnel	Number of non-Caucasian personnel	Number of female personnel
Graduate students	62	24	24
Post-doctoral scholars	13	11	4
Staff	78	Data not available	30
Faculty	45	4	6

An inclusive departmental community may be encouraged by maintaining strong lines of communication and preventing barriers to interactions among colleagues. The advisory committee surveyed the staff and faculty regarding the quality of our communications and interactions.

Staff survey results:

Interactions with other staff and faculty members:

Multiple opportunities to interact exist that are both departmentally sponsored and informal small social groups. The staff feel that these interactions are helpful in creating cohesive work environments between groups on shared projects as well as providing some cross discipline learning opportunities. Most staff feel their interactions are quite helpful and do not hinder their work loads. Some mention of slight distractions due to personal conversations being lengthy but otherwise most feel interactions are beneficial and not interruptive.

Some negative comments received included staff feeling unappreciated and taken advantage of. Morale is quite low and there is no real incentive to exhibit excellent job performance. Some responses included being treated as "hired help" and not being given recognition for participating in projects and/or for excellent work. Other comments included being treated poorly by other researchers, other than supervisors, and others being unwilling to provide support to those not directly involved with their projects.

Overall, interactions seem to be helpful to all who are utilizing the resources available.

Communication:

Most responses were positive in regards to communication being that the lines of communication are open within and between staff and faculty. Some responses referred to the use of emails, planning meetings and general face-to-face meetings as their primary sources of communication with each other and faculty. Generally speaking, most feel well informed and comfortable to speak directly with their supervisor or advisor. Most of the staff also feels new staff is supported both by existing staff and faculty members so they may begin their work in an efficient manner.

Negative comments were fewer, regarding communication, but included timely dissemination of information (being that info was sent out with too little time to respond/absorb) and some feel they are not being included in some communication.

Communication between and with staff and faculty appears to be sufficient.

Faculty Survey Results:

Interaction**:**

Overall, the atmosphere in our department for interaction is considered supportive, friendly and social. Faculty interact on the development of research proposals, manuscripts and conducting of projects, on graduate student committees, commodity science working groups (e.g., Wheat Science, Corn and Soybean Science), task force activities, and several social gatherings (e.g., Grains group coffee). Interaction is fruitful with respect to combining various experts' know-how in a project, getting immediate work needs accomplished, and having an atmosphere that supports exchange, criticism and improvement.

The importance of technical staff for the successful conducting of research proposals, land and field management is pointed out by many faculty members. Support through creative staff is especially appreciated as a strength in our department, while some faculty and staff members are avoided as they are less willing to help. Another positive aspect is the interaction across departmental boundaries, i.e., cooperation exists with Animal Sciences and Biosystems and Ag Engineering. Also, interaction with USDA scientists – some of them became adjunct faculty members of our department – is mentioned to be a source of productivity. Occasionally, social interactions take up more time than people would like, but in general, social interactions are considered helpful. Several faculty members mention that their scope of research efforts could be broadened and their efficiency could be improved by more interaction.

Intellectual growth of graduate students could be achieved by forming multi-disciplinary teams which would also enhance funding opportunities.

Interaction between faculty members in the department is not always adequately recognized in the merit review process, e.g., when collaboration yields "only" co-authorship on

a publication. Interaction with colleagues outside of our department seems more important in terms of securing funding and recognition.

It is considered difficult to enforce interaction as the time to get the work done is always limited, and enhancing the level of interaction by building teams means to give up autonomy, and requires a lot of trust. Some individuals have the opinion that rather than interaction, support and encouragement from the department chair and the freedom to develop programs are mentioned as essential departmental functions for a productive working environment.

Young faculty members beginning their work at our department apparently are well supported.

Communication:

Overall, the level of information communicated personally or through e-mail is considered very well. Some individuals do not always feel well informed. The department chair's timely e-mails with providing necessary information are very much appreciated by the majority of faculty members. A departmental newsletter would be helpful to further improve communication, as suggested by several faculty members.

The faculty has been recognized for its productivity and quality by numerous awards and for its scientific expertise by serving in numerous editorial positions and providing service to numerous scientific societies. These activities are summarized for recent years in Appendix 9. Since that summary department faculty members have received additional scientific recognition. Harold Burton will be honored with the 2011 Lifetime Achievement in Tobacco Science award and David VanSanford will be named a fellow in the Crop Science Society of America and the American Society of Agronomy.

The department strives to create an environment and provide resources which stimulates and maintains this productive faculty. The advisory committed surveyed the faculty in this regard. Faculty (including adjunct and research faculty) were surveyed to obtain their evaluation of the department and its ability to provide the programs and services needed to sustain a creative and productive department. Faculty were queried as to the strengths and weaknesses of the department, departmental functions that encourage or limit performance and achievement, and what can be done to improve the department.

Thirteen faculty responded to the survey. What follows is a summary of their responses realizing that with only 13 responses some positions may represent the opinion of only a few faculty.

Faculty generally felt that the department provided a supportive collegial work environment. The large diverse faculty with extensive knowledge in multiple disciplines was seen as a significant contributor to the strength of the department. Many faculty felt that the freedom to pursue individual research interests and the cooperation between research and extension faculty were important strengths.

Ironically, the strengths identified by the faculty are, or contribute to, the weaknesses of the department. The size of the department, the physical division into three buildings on the main campus and separation by discipline were thought to contribute to a tendency for too much individualistic activity and a lack of interaction and cooperation. Encouragement of

communal activities (e.g., one seminar instead of three) or common research projects were proposed as solutions to this problem. Current successful communal activities (e.g., forage and grasslands discussion group, wheat science group, corn and soybean group, grains Friday coffee meeting) were seen as effective antidotes to the problems created by size and dispersion.

Declining faculty numbers was regarded as a serious problem, one that will inhibit the ability of the department to improve and to service the future needs of the people of Kentucky. Moreover, a lack of quality staff to support faculty activities, particularly administrative staff to relieve faculty of the many onerous requests by the University for information and to support the pursuit and management of grants was identified as a factor seriously limiting faculty achievement.

In summary, the faculty gave the department high marks for providing a stimulating work environment, but they are very concerned about the future – will the trend towards fewer faculty and declining resources destroy a strong productive department? Many feel that this is the future if current trends are not reversed quickly.

ANALYSIS OF STRENGTHS AND RECOMMENDATIONS FOR QUALITY ENHANCEMENT

SUMMARY OF STRENGTHS

Support of the Land Grant Extension Mission:

Many departmental faculty members, including those with no formal extension appointment, support the extension mission through applied research and outreach programs. The programs supporting agronomic commodities are among the most well known and respected in the country. The strength of these programs is not just a result of the extension faculty within each programming area, but rather the support and effort provided by multiple faculty members with common goals. For example the multi-departmental Wheat Science Group has focused on increasing profitability and sustainability of grain crop production through breeding and management. Similarly, research in burley and dark tobacco from variety development and transplant production through crop management to market preparation informs comprehensive educational support for growers, extension agents, and the tobacco industry. Individuals in several programs including turfgrass, tobacco, forages, and grain crops have achieved national and international recognition as evidenced by leadership in national and international organizations and invitations to tour and speak abroad. During the past six years 3 Extension faculty members were presented the M.D. Whitaker Award in recognition as Outstanding Specialist and 2 faculty members received the Outstanding New Extension Specialist Award. Additionally the Wheat Science Workgroup and the Horse Pasture Evaluation Program have been recognized for Outstanding Extension programs. Partnership between research and extension has integrated the successful delivery of technology and research results to stakeholders while concurrently educating graduate students, publishing in refereed journals and competing successfully for extramural funds. Field research, variety trials, and demonstration activities are spread state-wide in over 60 counties across Kentucky. Extension and other faculty conduct and support targeted educational programs such as the Grain Crops Academy, Master Grazer, Master Cattleman's, Innovative Tobacco Growers, Kentucky Turf Short Course, and annual Kentuckiana meeting. High ratings by county level extension staff and customer/client satisfaction with extension programs provides additional evidence of the strength of support for the extension mission. The department and college should strive to facilitate and maintain the infrastructure and environment (mindset) that encourages faculty to continue their strong support for extension functions.

Breadth of Research Topics:

The large, diverse department conducts research in many areas. The breadth of research topics and collaborative efforts between basic and applied researchers allows for a unique research perspective. Diversity contributes strongly to innovative thinking. Looking at the same problem from very diverse perspectives develops multiple sound hypotheses and experimental approaches. We look at cropping systems from production, management and utilization involving soils, plants, the rhizosphere and their interactions. For the future we have the expertise to research water and contaminant transport through the vadose zone and enhancing

root growth through impermeable layers to improve dry land agriculture. We will need to create genetic resources and design and develop management strategies to help growers adapt to climate change. We investigate plant natural products, gene expression mechanisms, transcription factors, and RNA biology giving us the ability to integrate new gene expression patterns into crop management programs. We investigate the potential for bioenergy ranging across implementing large scale co-firing tests to field productivity testing to improving reactor biology to creating improved enzymes for energy conversion to manipulating algal oil production. Integration with the USDA Animal Forage Production Unit allows a broad focus on forages from ecology to grazing to weed science to chemistry to molecular biology, and forage research is a critical component of UK's Equine Initiative. Environmental science ranges from soil chemistry including nanoparticles and colloids in the environment, restoration of disturbed environments, combustible mining wastes, and water quality to weed science including herbicide mechanism of action, weed resistance, and weed management environmental impacts. Limiting air and water pollution and soil degradation through appropriate soil, water, and crop management has been and will remain a departmental focus. Partnering with the Kentucky Tobacco Research and Development Center and the University of Tennessee creates a diverse tobacco science program sharing scientists and ideas. Our research strength springs from our diversity, breadth, and cooperation.

Cooperative Interdisciplinary Instruction:

As undergraduate agronomy enrollment has declined precipitously, the department continues to participate in undergraduate education through interdisciplinary programs and will look for additional avenues for participation. The department participates actively in the multidisciplinary curricula of the college. We teach, provide leadership, and interact with students in the undergraduate Agricultural Biotechnology, Natural Resources and Environmental Sciences, Equine Sciences and Management, and Sustainable Agriculture programs. Faculty members developed and participate in the UK Honors Program World Food Issues track. The department promotes instructor participation in the college's required Issues in Agriculture courses and with UK Core. This interdisciplinary participation extends also to graduate education. The department promoted and cooperated with all other interested departments in developing the Integrated Plant and Soil Sciences graduate program. Through these interdisciplinary programs the department will continue our role educating students at the university.

Faculty

The faculty (Appendix 4) is proud of our service to and recognition by our scientific societies (Appendix 9) along with our contributions to an array of editorial boards (Appendix 10).

RECOMMENDATIONS FOR QUALITY ENHANCEMENT

The department needs to articulate our desires and resolve several big questions as we define our needs for quality enhancement.

1) Enrolling students in the Horticulture, Plant and Soil Science undergraduate program:
   Do we, with the Department of Horticulture, drop the HPLS undergraduate program? Do we search for alternatives to increase enrollment which would require devoting significant resources to student recruitment. These significant resources could include having participating faculty members adopt a high school for recruiting and science support activities, sharing a recruiting coordinator, targeting scholarships to high school contest winners (such as land judging), guaranteeing jobs in research laboratories, creating a three year curriculum with distance education courses and funded internships for summer credit.
2) Organizing our extension faculty to serve the state:
   Our past has been defined by two extension specialists for most commodity groups. Currently our extension faculty number has been declining. Do we continue with the two specialist model? If we abandon that model how do we maintain a significant presence in west KY? What presence do we maintain at RCARS? Could we fill the void programmatically with extension associates, and do we have the resources to support them if we choose that route?
3) Defining our research priorities for future faculty positions:
   We identified our research diversity and breadth as one of our strengths. But as faculty numbers decrease some areas are left wanting. How do we proceed with defining critical areas for faculty hiring? Do we choose continued breadth or do we concentrate on creating a critical mass of faculty members in specific areas and diminish our breadth? Would targeting specific research areas as strengths enhance our graduate program quality?

For our undergraduate programs we recommend:

1. Meeting the needs recommended as we decide how to proceed 'Enrolling students in the HPLS undergraduate program'
2. Increasing our contributions to and integration in campus wide initiatives
3. Defining teaching responsibilities within the ABT, NRES and SAG curricula as we hire for new faculty positions
4. Hiring a 50% lecturer to provide a statistical reasoning undergraduate course in the UK Core specific for agriculture students
5. Modernizing and fully equipping the soil science teaching lab
6. Modernizing and fully equipping the agricultural biotechnology teaching lab

For the IPSS graduate program we recommend:

1. Higher stipends: $20,000 for PhD and $17,000 for MS students
2. Developing specific teaching experiences for graduate students
3. Continuing providing funds for students to attend research conferences
4. Creating an MS level distance education program with an extension agent focus
5. Broadening graduate student exposure to diverse ideas by inviting more seminar speakers from other institutions and facilitating visiting scientists and their participation in our graduate education program
6. Reviewing graduate courses with the intention of consolidating courses. Offer new courses in cooperation with graduate programs at other universities.
7. To encourage graduate student recruitment, creating a safety net guaranteeing RA funding for the duration of a student's program if grant funding runs out before the student finishes.
8. Identifying additional graduate student desk space

For our extension programs we recommend:

1. Meeting the needs recommended as we answer the question regarding 'Organizing our extension faculty to serve the state'
2. Providing partial extension associate or research technician positions for each faculty specialist
3. Providing staff support for electronic communication technologies, e.g. web site maintenance, social media, distance delivery of meetings
4. Working with the college to construct an educational/meeting facility at Spindletop research farm

For our research programs we recommend:

1. Hiring a 50% statistical consultant to advise graduate students and faculty members on statistical design and analysis
2. Hiring an administrative support assistant focused on 1) grant management and report submission, 2) grant development and consortium coordination.
3. Developing a core analytical facility that can be used for non-targeted chemical analysis of plant and soil samples and that serves the analytical needs of Kentucky agriculture as well as our research programs. Sample analyses on a cost recovery basis would support this facility. We envision a lab space of 1,000 square feet. The facility should have a faculty director and two full-time technical persons. The initial equipment for the facility includes a GC-MS ($150,000 plus $10,000 for an annual service contract) and an HPLC-MS ($250,000 plus $20,000 per year for a service contract). Initial start-up for the unit would be approximately $500,000 for a 3 year period. Then the unit must generate adequate funds to become self-sustaining. This models the AGTC facility available for molecular genetics analyses.

4. Substantially improving our research farm support infrastructure e.g. replacing the dark fire tobacco barn at Princeton, replacing the sample drying facility at Spindletop and adding a field sample processing area, additional storage space at Spindletop including secure fertilizer storage, increasing the farm support staff at Princeton including a mechanic, adopting field plot GPS technology, field scale equipment supporting climate change research
5. Providing PIs easier budget and account management by showing individual transactions monthly

Appendix 1

Department of Plant and Soil Sciences
2009-2014 Strategic Plan

MISSION

- To improve, through scholarly research, the understanding of plant and soil systems as sustainable resources for human use while preserving and enhancing environmental quality.
- To recruit, educate, and graduate top-quality students and serve our broad-based clientele by providing progressive education programs and effectively interacting with partners in the public and private sectors.
- To anticipate and effectively respond to societal needs for improved agricultural productivity and for the wise use of natural resources in order to enhance the quality of life.

VISION

The department strives to balance the three mission areas of a land-grant institution: teaching, research and extension. We take seriously our role of responding promptly to agricultural and environmental issues. We address a broad subject matter including the chemistry, physics and biology of plant, soil and environmental systems ranging from the molecular, to the whole plant, to the ecosystem. The department works towards sustainable and profitable crop production, renewable resource management, and environmental protection for now and the future.

GOAL 1
Prepare Students for Leadership in an Innovation-Driven Economy and Global Society

Educating undergraduate and graduate students and preparing them for a professional career is a primary mission of the department. We expect that our graduates will become innovators in plant and soil sciences and in applying these sciences to agriculture and the environment. Our graduates are expected to be critical thinkers, well-versed in scientific methods and able to confront career associated challenges anywhere in the world.

Most Significant Challenges

- Low enrollment in the Horticulture, Plant and Soil Science and the Sustainable Agriculture undergraduate programs
- Increasing the number of degrees awarded annually in graduate programs
  1) Departmental graduate programs are fragmented
  2) Departmental support for assistantships and tuition is limited
  3) Research assistantships are dependent on time-limited grant funding
  4) Need to educate graduate students who are employed outside Lexington
- Underrepresentation by in-state undergraduate and graduate students

Strategies

- Increase recruitment of students interested in production agriculture
- Combine MS and PhD programs into one Integrated Plant and Soil Sciences program with options including plant biology, crop science, soil science, horticultural science and forestry.
- Emphasize research assistantship funding in grant proposals
- Seek TA support by gaining approval of PLS courses in the General Education curriculum
- Offer more courses via distance learning
- Recruit graduate students from regional universities

Key Indicators, by 2014 the Department will have:

1. Graduated at least eight students per year in each undergraduate program in which we participate.
2. Fully implemented the IPSS graduate program.
3. Increased grant-funded research assistantships by 1 per year.
4. Funded three teaching assistantships through participation in General Education courses.
5. Offered five classes via distance learning
6. Enrolled five graduate students from Kentucky's regional universities

GOAL 2
Promote Research and Creative Work to Increase the Intellectual, Social and Economic Capital of Kentucky and the World beyond its Borders

The department's land-grant mission encourages truly creative research endeavors that result in new knowledge. Further, we aspire to capitalize on the individual and collective achievement of our faculty by applying discoveries to the improvement of agriculture, industry, and the natural environment. The department integrates discovery science and applied research and technology in teaching, technology transfer, and outreach activities to solve problems and generate economic, societal, and environmental benefits.

Most Significant Challenges

- Funding rates are decreasing for individual investigator proposals in federal agency programs
- Need to create multi-institutional and multi-focus (research, extension, instruction components) teams to be competitive for federally funded multidisciplinary grants
- Availability of funding for applied and basic field research

Strategies

- Develop departmental "Targets of Opportunity" to identify research areas where cutting-edge science and critical mass exist to achieve national and international prominence
- Develop inter-/multi-/trans-disciplinary research teams, facilities, and resources within the department, university, and with other universities
- Aggressively pursue targeted initiatives to increase extramural research funding from all sources, with particular emphasis on federal competitive funding
- Vigorously pursue funding for applied and basic field research from commodity groups and industry
- More rapidly disseminate research findings for the scientific and lay audiences

Key Indicators, by 2014 the Department will have:

1. Submitted at least one nationally competitive grant focused on each identified "Target of Opportunity".
2. Averaged >$3,500,000 per year from extramural grants.
3. Received 40% of the department's extramural funding from federal competitive grant awards.
4. Averaged > 3.0 book chapters + refereed journal articles per research FTE per year.
5. Averaged two student authored publications per doctoral degree and one student authored publication per MS degree.

GOAL 3
Develop the Human and Physical Resources of the Department to Achieve Top 20 Stature

Our success and progress results from the success of our people: faculty, staff and students. Our people and their activities should not be constrained by our technical resources and physical facilities. Faculty members fill the critical role by generating and developing ideas which attract funds to enhance our resources and support our staff and students.

Most Significant Challenges

- Filling vacant faculty and staff positions in the face of stagnant/declining budgets
- Retention and compensation of highly skilled staff members
- Improving and expanding technical resources and physical facilities (including laboratory, field, and graduate student facilities) to enhance productivity and increase competitiveness for research funding

Strategies

- Develop and implement strategies for identifying, recruiting, mentoring, promoting, and rewarding new faculty members, staff, and students
- Facilitate faculty sabbaticals and professional development opportunities
- Maintain or increase staff and technical support, eliminate disparities in salaries of support personnel, and reward exceptional technical staff
- Vigorously represent department personnel needs to college administration.
- Teams on campus and at research stations prioritize equipment needs, and submit proposals to acquire equipment from extramural grants, College and University matching funds, or other sources
- Identify resource and facility priorities and aggressively advocate for these priorities

Key Indicators - By 2014 the Department will have:

1. At least one faculty member named a Fellow (or equivalent) of a national professional society and at least one faculty member per year who received a state, regional and/or national award.
2. Submitted one equipment grant per year.

Goal 4

Nurture Diversity of Thought, Culture, Gender, and Ethnicity

The department is committed to creating an environment where differences are valued and all individuals have the opportunity to succeed, reaching their highest potential. Respect for diversity of thought, culture, and all human differences is a cornerstone of the land-grant philosophy. To fulfill our mission, the department must be inclusive and responsive to the needs of all students, staff, faculty and citizens. We seek a work and learning environment where differences are valued, an environment in which diversity, fairness, and equity in our policies and activities promote engagement, learning, and discovery. To this end, it is important that departmental programs in instruction, research, and extension are inclusive in reaching and serving the needs of traditional and non-traditional audiences.

Most Significant Challenges

- Agriculture is a disciplinary area which is generally not intriguing and attractive to minorities seeking STEM (Science, Technology, Engineering and Mathematics) careers

Strategies

- Recruit both undergraduate and graduate minority students and establish contacts and partnerships with faculty at 1890 land-grant universities
- Participate in programs such as the Kentucky Young Scientist Summer Research Program and Young Women in Science to showcase and attract students to our programs
- Work with the Assistant Dean for Diversity to institute the strategies outlined in the College Diversity Report to promote diversity in the applicant pools for faculty, staff and student positions

Key Indicators, by 2014 the Department will have:

1. Increased racial and ethnic diversity among students, staff and faculty.
2. Maintained gender inclusive student, staff and faculty populations.
3. Submitted two proposals to programs focused on the scientific development and recruitment of students underrepresented in STEM fields.

Goal 5
Improve the Quality of Life for Kentuckians through Extension, Outreach and Service

A rapidly changing agricultural landscape creates an unprecedented demand for knowledge- and research-based educational programs. Our department is committed to informing county agents, farmers, agribusiness personnel, and all our citizens about the best practices for agricultural production, environmental protection, and economic sustainability, along with the underlying scientific basis for these practices.

Most Significant Challenges

- Declining extension faculty FTEs (Full Time Equivalents) due to budget shortfalls, increasing reliance on split appointments, administrative assignments, and post-retirement appointments. We are at the minimum critical level necessary to maintain programs and to meet the indicators below for contacts, and extension activities. The further erosion of extension FTEs would negatively impact key program areas.
- Declining percentage of federal and state funding for extension programs and the concomitant increasing reliance on external funding sources for traditional extension programs and activities
- Integrating new information delivery technology while maintaining traditional methods preferred by some clientele
- Limited support to implement the new information delivery technology
- Increasing demands on extension faculty to assume teaching responsibilities

Strategies

- Emphasize the critical faculty leadership component needed to maintain quality extension programs in forages, turf, grain crops, tobacco, soil science, weed management, and water quality across Kentucky, including counties in East Kentucky, while exploring how extension associates could be used to enhance efforts of extension faculty.
- Take advantage of grant programs with specific outreach objectives, and encourage extension faculty members' participation in multi/trans-disciplinary teams on appropriate "Targets of Opportunity"
- Solicit support through the college's Agricultural Communications Services and other groups to more fully use new information delivery systems and technology
- Develop new, and support current, state-wide educational initiatives such as the Grain Crops Academy, Master Grazer Program, Innovative Tobacco Grower Program, and Turf and Landscape Management Short Course

Key Indicators, by 2014 the Department will have:

1. Maintained the current level of 13 extension faculty FTE's in Plant and Soil Sciences.
2. Submitted an average of 2 proposals per extension FTE annually to support extension programming in the department.
3. Sustained extension contacts within the department at or above 50,000.
4. Achieved at least 75% participation each year by agriculture and natural resource agents in training programs.
5. Conducted on-site research/demonstration activities in a minimum of 30 counties each year.
6. Developed at least six new or significantly revised numbered extension publications each year.

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Appendix 2
Recommendations in the 2005 Departmental Review and the department's actions

General:

1. Develop a more formal process for involving faculty and staff in determining hiring priorities.

When considering filling a vacant faculty position the department solicits proposals from the faculty. These proposals are discussed by the department advisory committee, which ranks the positions. The advisory committee's ranking is discussed at a faculty meeting. The chair invites written comments. The chair makes the final decision as to which position to propose to the dean.

2. Number of faculty per clerical staff should be closely evaluated given the unit average is 15-1. Evaluate the equitability of staff workloads between floors, among programs and among buildings.

The department formed a one-time clerical support assessment committee. The committee did not recommend increasing clerical staff. The department moved all travel and Procard management functions to one position in the main office.

3. Consideration should be given to providing more IT support not only for machine maintenance, but also for developing and maintaining web pages.

The department created a standing web committee. Tom Mueller has chaired this committee since its inception. The department employs an hourly temporary employee to work only on web pages. This is approximately a 20 hour per week position reporting to Tom Mueller. His activities are primarily at the request of Tom and the department chair. Individuals still ask for more web assistance.

4. Department should continue to formalize efforts to increase departmental diversity, in part, by coordinating with college efforts.

The department follows the guidelines established by the college regarding search committee function and contacts the college diversity office during each search.

Instructional:

1. A review of the undergraduate PLS program should be initiated given 11 years have passed since its creation.

A review was not conducted.

2. Facilities and funding for instruction require upgrading; this should be a departmental, college and university effort.

More classrooms in AGN, such as A6, are now smart classrooms.

3. A formal Integrated Plant and Soil Sciences Graduate Program proposal should be finalized and presented to the interdepartmental faculty for approval. Steps should be taken to forward this to the Graduate School as soon as possible.

The program has been approved and will officially begin January 2012.

4. Investigate options for Ph.D. and Post Doctoral Scholars to participate in meaningful teaching activities.

Graduate students may teach laboratory sections of PLS 366 or the laboratory class ABT 495. Post Doctoral Scholars have not taught courses.

5. Be sure the department's instructional web pages are kept current.

Sections of the department's web pages are surveyed approximately quarterly for accuracy and functional links. The department's instructional pages link to the college and university pages, and those pages also need routine review.

6. The Graduate Student handbook needs to be updated and distributed at a required formal orientation for students.

The graduate student handbook lay dormant as the department focused on establishing the IPSS program. Mark Coyne has updated the graduate student handbook for the remaining students who enter the Plant and Soil Science MS program and the Crop Science, Plant Physiology and Soil Science Ph.D. programs through fall 2011. A required formal orientation for graduate students is held at the beginning of each fall semester.

7. Continue to actively recruit quality graduate students and to investigate ways to improve GRE scores where appropriate.

We have been unable to increase GRE scores of applicants and admitted graduate students.

GRE scores and percentiles of students who applied/enrolled Fall 2010								
	Applied		Enrolled		Applied		Enrolled	
Program	Verbal	Verbal %	Verbal	Verbal %	Quant	Quant %	Quant	Quant %
AGR - MS	446	46	454	48	620	54	568	49
CRO - PhD	339	34	370	36	514	44	648	59

PPH - PhD	457	50	450	47	702	78	615	52
SOI - PhD	400	37	453	48	565	49	607	52

Research:

1. The college should take appropriate steps to seek faculty input into the "school of Natural Resources."

Creation of the "school" did not proceed.

2. Continue to monitor the balance between applied and basic research, particularly as it may be reflected in faculty hiring priorities.

The established process to involve faculty in determining hiring priorities (see General 1) should monitor this concern.

3. Encourage faculty to seek additional funds from KTRDC to further strengthen the working relationship.

KTRDC funded a grant proposal which included the four faculty members located in the KTRDC building.

4. Strengthen the role of the farm oversight committee in overseeing departmental research trials.

The department's oversight of research trials has not changed since the last review.

5. Consideration should be given to identifying one person for managing departmental farm facilities, including oversight of pesticide signage.

Although Jimmie Calvert and Charlie Slack provide oversight of departmental farm facilities, managing the facilities remains decentralized. Individual programs focus on their assigned areas.

6. Research facilities at the Lexington and Quicksand farms require improvement and modernization.

Storage facilities were constructed at the Lexington farm.

7. The department faculty should provide strong leadership in identifying and developing new research initiatives.

Strong leadership was provided by faculty members in the department in developing large regional consortia to compete for two different AFRI projects in 2010.

8. Continue to strengthen the evolving association with the new USDA Forages Program.

Departmental faculty and USDA FAPRU have a close working relationship, with numerous joint research projects. Three USDA FAPRU scientists are adjunct faculty members in the department.

Extension:

1. Continue the recent policy of appointing new extension specialists with a partial research appointment.

All extension specialists hired since the last review have partial research appointments.

2. With more split appointments (reduced extension FTEs), determine how ongoing needs for extension programming are going to be met.

3. Examine innovative ways to increase development of multi-partner (in-state) and multi-state extension materials and programs.

4. Continue to provide leadership in multi-disciplinary programs with the Wheat Science Extension Group and the ENRI Task force serving as excellent models.

This has continued.

5. Extension faculty should maintain close cooperation with research faculty, and seek more collaborative opportunities for extramural funding.

This cooperation has been maintained.

Departmental Leadership:

1. We recommend periodic informational meetings between the department's leadership and the various staff groups to gather staff input and to relay departmental update information.

The department has held fall and spring staff meetings for both farm and laboratory/office staff.

2. Make use of the department's advisory committee to assist the chair in defining priorities and resolving issues (such as whether or not to hire additional IT

personnel) as well as serve as a sounding board concerning the progress of departmental initiatives.

The advisory committee meets monthly (almost) during the fall and spring semesters.

3. Department chair should examine one or a combination of options for assisting in the completion of necessary assignments on a timely basis.

The chair relies on the Directors of Graduate Studies, the Directors of Undergraduate Studies, and the advisory committee to assist in completing required reports and projects.

4. It is imperative that the department's leadership move forward to implement the recommendations and actions of the recent faculty retreat so as to maintain departmental momentum for identifying priorities.

Appendix 3

UK College of Agriculture
Department of Plant and Soil Sciences
2009-2014 Strategic Plan
Update November 2010

GOAL 1
Prepare Students for Leadership in an Innovation-Driven Economy and Global Society

Key Indicators, by 2014 the Department will have:

7. Graduated at least eight students per year in each undergraduate program in which we participate.
    a.

	08-09	09-10	10-11	11-12	12-13	13-14
Crops and Livestock/Crop and Soils students	0 / 5	2 / 5				
HPLS graduates	14	12				
ABT graduates	15	29				
NRCM graduates	12	14				

8. Fully implemented the IPSS graduate program.
    a. Proposal was submitted-reviewed by The Graduate School and CPE formal response to questions submitted.
9. Increased grant-funded research assistantships by 1 per year.
    a.

	08-09	09-10	10-11	11-12	12-13	13-14
# of grant funded assistantships	15	17				

10. Funded three teaching assistantships through participation in General Education courses.
    a. Two courses were submitted for Gen Ed approval. If approved, will require TA support.
11. Offered five classes via distance learning
    a.

	09-10	10-11	11-12	12-13	13-14
# of classes	2				
class titles	PLS 557 Seed Vigor PLS 412 Grain Crops				

12. Enrolled five graduate students from Kentucky's regional universities

a.

	09-10	10-11	11-12	12-13	13-14
# of students	6				
Students/University	Starnes/WKU Balatzley/Murray Davis/Berea Brosi/EKU Tolson/Morehead Jordan/Berea				

GOAL 2
Promote Research and Creative Work to Increase the Intellectual, Social and Economic Capital of Kentucky and the World beyond its Borders

Key Indicators, by 2014 the Department will have:

6. Submitted at least one nationally competitive grant focused on each identified "Target of Opportunity".
    a. Committee created and process delineated for defining targets of opportunity.
7. Averaged >$3,500,000 per year from extramural grants.
    a.

	08-09 baseline	09-10	10-11	11-12	12-13	13-14
Grant funds	$3,920,885	$7,587.084				

8. Received 40% of the department's extramural funding from federal competitive grant awards.
    a.

	08-09 baseline	09-10	10-11	11-12	12-13	13-14
Percent federal funding	56%	57%				

9. Averaged > 3.0 book chapters + refereed journal articles per research FTE per year.
10. Averaged two student authored publications per doctoral degree and one student authored publication per MS degree.
    a.

	08-09 Baseline	09-10	10-11	11-12	12-13	13-14
Refereed publications per research FTE	3.7					
Student authored publications						

GOAL 3
Develop the Human and Physical Resources of the Department to Achieve Top 20 Stature

Key Indicators - By 2014 the Department will have:

3. At least one faculty member named a Fellow (or equivalent) of a national professional society and at least one faculty member per year who received a state, regional and/or national award.
    a. 09-10

        Ole Wendroth-Fellow Soil Science Society of America
        Glen Aiken-Fellow Crop Science Society of America
        Joe Chappell-Fellow American Association for the Advancement of Science

4. Submitted one equipment grant per year.
    a. Year 1

        none submitted.

    b. Year 2

    Atomic Absorption Spectrometer - submitted for College research activity award - successful.
    Corn Sprayer-Princeton - submitted for joint commodity group support - Kentucky Soybean Association, Kentucky Corn Grower's Association, Kentucky Small Grain Grower's Association - under consideration.

Goal 4

Nurture Diversity of Thought, Culture, Gender, and Ethnicity

Key Indicators, by 2014 the Department will have:

4. Increased racial and ethnic diversity among students, staff and faculty.
5. Maintained gender inclusive student, staff and faculty populations.
   a.

Non-white Student/Total	09-10	10-11	11-12	12-13	13-14
NRCM undergraduate	1/65				
ABT undergraduate	35/167				
HPLS undergraduate	0/44				
PSS graduate	24/62				

Female Student/Total	09-10	10-11	11-12	12-13	13-14
NRCM undergraduate	24/65				
ABT undergraduate	103/167				
HPLS undergraduate	6/44				
PSS graduate	24/62				

   b.

Non-white personnel/Total	09-10	10-11	11-12	12-13	13-14
Graduate students	24/62				
Post doctoral scholars	11/17				
Department staff (information not collected by HR)	?				
Faculty	4/45				

Female personnel/Total	09-10	10-11	11-12	12-13	13-14
Graduate students	24/62				
Post doctoral scholars	4/13				
Department staff	30/78				
Faculty	6/45				

6. Submitted two proposals to programs focused on the scientific development and recruitment of students underrepresented in STEM fields.
   a. Nadine Kabengi: PI
   "Who Wants to Be a Scientist: A problem-based Learning discovery Class on the Nature of Science to Attract Undeclared Freshmen into STEMS majors" National Science Foundation. Directorate for Education & Human Resources. Research on Learning in Formal and Informal Settings. Fostering Interdisciplinary Research on Education.

Goal 5
Improve the Quality of Life for Kentuckians through Extension, Outreach and Service

Key Indicators, by 2014 the Department will have:

7. Maintained the current level of 13 extension faculty FTE's in Plant and Soil Sciences.

	09-10	10-11	11-12	12-13	13-14
Extension faculty FTE	11.0				

   a.

8. Submitted an average of 2 proposals per extension FTE annually to support extension programming in the department.

	09-10	10-11	11-12	12-13	13-14
Extension grant proposals	27				
Grant proposals per FTE	2.4				

   a.

9. Sustained extension contacts within the department at or above 50,000.
10. Achieved at least 75% participation each year by agriculture and natural resource agents in training programs.
11. Conducted on-site research/demonstration activities in a minimum of 30 counties each year.

	09-10	10-11	11-12	12-13	13-14
Extension contacts	57,700				
Agent training participants	130				
County on-site research activities	57				

   a.

12. Developed at least six new or significantly revised numbered extension publications each year.

	09-10	10-11	11-12	12-13	13-14
Numbered Extension Publications	16				

   a.

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Appendix 4

Faculty in the Department of Plant and Soil Sciences – July 2011

2011-2012 Faculty List Plant and Soil Sciences				
Post-retirement	Professor	Associate	Assistant	Adjunct
	Baskin, Carol	Bailey, Andy	Kabengi, Nadine (research)	Denton, Paul (unofficial)
	Barrett, Mike	D'Angelo, Elisa	McCulley, Rebecca	Aiken, Glen
	Bertsch, Paul	Lee, Brad	McNear, Dave	Dinkins, Randy
Bush, Lowell	Chappell, Joe	Lee, Chad	Moe, Luke	Kagan, Isabelle
	Coyne, Mark	Matocha, Chris	Ritchey, Edwin	Sikora, Frank
	Davies, Maelor	Mueller, Tom	Tsyusko, Olga (research)	
	Ditsch, David	Pearce, Bob	Unrine, Jason (research)	
	Egli, Dennis	Perry, Sharyn		
	Grabau, Larry	Phillips, Tim		
	Green, JD	Smalle, Jan		
	Grove, John	Tang, Guiliang		
	Hildebrand, David	Wendroth, Ole		
	Hunt, Art	Williams, David		
Herbek, Jim	Karathanasis, Tasios	Yuan, Ling		
	Martin, Jim	Zhu, Hongyan		
	Miller, Bob			
	Murdock, Lloyd			
Lacefield, Garry	Pfeiffer, Todd			
	Smith, Ray			
	VanSanford, Dave			
	Wagner, George			
	Witt, Bill			

Appendix 5
College Research Productivity Tables

http://www2.ca.uky.edu/deanadmin-files/04-05compositePlant_and_Soil.pdf
http://www2.ca.uky.edu/deanadmin-files/04-05Plant_and_Soil_Sciences.pdf
http://www2.ca.uky.edu/deanadmin-files/05-06Plant_and_Soil_Sciences.pdf
http://www2.ca.uky.edu/deanadmin-files/05-06CompositePSS.pdf
http://www2.ca.uky.edu/deanadmin-files/06-07_Plant_and_Soil_Sciences.pdf
http://www2.ca.uky.edu/deanadmin-files/06-07_PSS.pdf
http://www2.ca.uky.edu/deanadmin-files/yellow_spreadsheets/2007_2008/Plant_and_Soil_Sciences.pdf
http://www2.ca.uky.edu/deanadmin-files/yellow_spreadsheets/2007_2008/2007_2008_composites/PSS.pdf
http://www2.ca.uky.edu/deanadmin-files/Plant_and_Soil_Sciences.pdf
http://www2.ca.uky.edu/deanadmin-files/PSS.pdf

Appendix 6

Courses offered in the three programs in which PSS participates and the PSS faculty members who teach or team-teach those courses				
Program/Course	Course Title	Credits	Instructor	Offered
Agricultural Biotechnology Program				
ABT 101	INTRODUCTION TO BIOTECHNOLOGY	1		F
ABT 201	SCIENTIFIC METHOD IN BIOTECHNOLOGY	1	Perry	F
ABT 301	WRITING & PRESENTATION IN THE LIFE SCI	2	Yuan	F, S
ABT 360	GENETICS	3		F
ABT 395	INDEPENDENT STUDY IN BIOTECHNOLOGY	1-4		F, S
ABT 399	EXPERIENTIAL LEARNING IN BIOTECHNOLOGY	1-6		F, S
ABT 460	INTRODUCTION TO MOLECULAR GENETICS	3	Moe	S
ABT 461	INTRODUCTION TO POPULATION GENETICS	3		S
ABT 495	EXPERIMENTAL METHODS IN BIOTECHNOLOGY	4	Chappell, Moe	F
Natural Resources and Environmental Science Program				
NRC 301	NATURAL RESOURCE CONSERVATION AND MGMT	3	Grabau	F
NRC 320	DATA COLLECTION TECHNIQUES	3		F
NRC 380	ANALYSIS OF NATURAL RESOURCE SYSTEMS	3		F
NRC 381	NATURAL RESOURCE POLICY ANALYSIS	3		S
NRC 395	INDEPENDENT STUDY IN NATURAL RESOURCES	1-6		F, S
NRC 399	EXPERIENTIAL EDU IN NAT RESOURCES	1-6		F, S
NRC 420G	TAXONOMY OF VASCULAR PLANTS	4		S
NRC 450G (cross listed with PLS)	BIOGEOCHEMISTRY	3	D'Angelo	S
NRC 455G (cross listed with PLS)	Wetland Delineation	3	Karathanasis	F even yr
NRC 470G (cross listed with PLS)	SOIL NUTRIENT MANAGEMENT	3	Grove	S
NRC 471	SENIOR PROBLEM IN NATURAL RESOURCES	3	Grabau	F
NRC 477G (cross listed with PLS)	LAND TREATMENT OF WASTE	3	Coyne	F
NRC 545	RESOURCE AND ENVIRON ECONOMICS	3		F
NRC 555	GEOGRAPHIC INFO SYSTEMS & LANDSCAPE ANAL	3	Zourarakis	F

Horticulture Plant and Soil Sciences Program				
PLS 100	AN INTRODUCTION TO HORTICULTURE PROFESSIONS	1		F
PLS 104	PLANTS,SOILS&PEOPLE A GLOBAL PERSPECTIVE	3	Barrett, D'Angelo, McCulley	F,S
PLS 210	THE LIFE PROCESSES OF PLANTS	3	Baskin, Smalle	F
PLS 220	INTRODUCTION TO PLANT IDENTIFICATION	3	Phillips	F
PLS 320	WOODY HORTICULTURAL PLANTS	4		F
PLS 330	HERBACEOUS HORTICULTURAL PLANTS I	2		F
PLS 332	HERBACEOUS HORTICULTURAL PLANTS II	2		S
PLS 340	Floral Design	3		F
PLS 366	FUNDAMENTALS OF SOIL SCIENCE	4	McNear, Matocha	F,S
PLS 386	PLANT PRODUCTION SYSTEMS	4		F
PLS 395	SPECIAL PROBLEMS IN PLS	1-4	Williams	F,S
PLS 396	SOIL JUDGING	1-2	Karathanasis	F
PLS 399	EXPER LEARNING IN PLANT AND SOIL SCIENCE	1-6	Williams	F,S
PLS 404	INTEGRATED WEED MANAGEMT	4	Witt	S
PLS 406	ADVANCED SOIL JUDGING	1	Karathanasis	S
PLS 408	TOBACCO	3	Pearce	F even yr
PLS 412	GRAIN CROPS	3	Lee, C.	S even yr
PLS 440	PLANT PROPAGATION	3		S
PLS 450G (cross listed with NRC)	BIOGEOCHEMISTRY	3	D'Angelo	S
PLS 451	LANDSCAPE MANAGEMENT AND ARBORICULTURE	3		F even yr
PLS 455G (cross listed with NRC)	WETLAND DELINEATION	3	Karathanasis	F even yr
PLS 468G	SOIL USE & MANAGEMENT	3	Mueller	F
PLS 470G (cross listed with NRC)	SOIL NUTRIENT MANAGEMENT	3	Grove	S
PLS 477G (cross listed with NRC)	LAND TREATMENT OF WASTE	3	Coyne	F
PLS 490	TOPICS IN PLANT AND SOIL SCIENCE	3	Williams, Witt	S
PLS 502	ECOLOGY-ECONOMIC PLANTS	3	Egli	F odd yr
PLS 510	FORAGE MANAGEMENT AND UTILIZATION	3	Dougherty	S
PLS 514	GRASS TAXONOMY AND ID	3	Phillips	S
PLS 515	TURF MANAGEMENT	3	Williams	F
PLS 520	FRUIT AND VEGETABLE PRODUCTION	4		S

PLS 525	GREENHOUSE FLORAL CROP MANAGEMENT	3		
PLS 531	FIELD SCHOOLS IN CROP PEST MANAGEMENT	2	Green	F
PLS 556	SEED TECHNOLOGY	3		F
PLS 557	SEED VIGOR	2	TeKrony	On-line
PLS 566	SOIL MICROBIOLOGY	3	Coyne	S
PLS 567	METHODS IN SOIL MICROBIOLOGY	1	Coyne	S
PLS 573	SOIL MORPHOLOGY & CLASS	3	Karathanasis	F
PLS 575	SOIL PHYSICS	3	Wendroth	F
PLS 576	LAB IN SOIL PHYSICS	1	Wendroth	F
PLS 597 A	SPECIAL TOPICS PSSC: PLANT GENOMICS	3	Zhu	S
PLS 597 B	SPECIAL TOPICS PSSC: RNAI & MICRORNA	3	Tang	S
IPS 610	INTEGRATED TRANS-DISCIPLINARY RESEARCH	2	VanSanford	F
IPS 625	INTEGRATED TRANS-DISCIPLINARY COMMUNICATIONS	1	Coyne	F
PLS 599	SP PROBLEMS IN PLANT & SOIL SCI	1-4	Williams	F, S
PLS 601	SPECIAL TOPICS MOLECULAR/CELL GENETICS	1	Chappell	S
PLS 602	PRIN OF YIELD PHYSIOLOGY	3	Egli	S even yr
PLS 609	PLANT BIOCHEMISTRY	3	Hildebrand, Yuan	S
PLS 620	PLANT MOLECULAR BIOLOGY	3	Hunt	F
PLS 622	PHYSIOLOGY OF PLANTS I	3	Wagner, Perry	F
PLS 623	PHYSIOLOGY OF PLANTS II	3	Smalle, Wagner	S
PLS 640 (cross listed with PPA)	IDENT OF PLANT DISEASES	3		F
PLS 642	BIOSYNTHESIS OF NATURAL PRODUCTS	3	Chappell	F
PLS 650	SOIL-PLANT RELATIONSHIPS	3	Sikora	F
PLS 655	SPATIAL AND TEMPORAL STATISTICS	3	Wendroth	F even yr
PLS 657	SEED BIOLOGY	3	Perry	S
PLS 660	ADVANCED SOIL BIOLOGY	2	Coyne	F even yr
PLS 664	PLANT BREEDING I	3	VanSanford	S
PLS 671	SOIL CHEMISTRY	4	Matocha	F even yr
PLS 676	QUANT INHER IN PLANT POP	3	VanSanford	S
PLS 712	ADVANCED SOIL FERTILITY	4	Grove	F
PLS 741	CLAY MINERALOGY	3	Matocha, Karathanasis	S
PLS 772	PLANT AND SOIL SCIENCE SEMINARS	1	Hunt, Dougherty, Unrine	F, S
Other courses taught by PSS faculty members				
BAE 599 004	TOPS BIOSYS ENGR: PRECISION AGRICULTURE	3	Mueller	S

GEN 100	ISSUES IN AG	3	Matocha, Coyne	F
GEN 200	ISS AGCONTEMP PROBS AGR & NAT RESOURCE	3	Mueller	S
HON 111	WORLD FOOD ISSUES 1: SEEDS AND HARVEST	3	Pfeiffer	F
HON 115	WORLD FOOD ISSUES II: YOUR DAILY BREAD	3	Grabau	S
HON 211	WLD FOOD ISSUES III: LIVING WITH LIMITS	3	Grove, Bertsch	F

Appendix 7

Mean summary scores from Teacher/Course Evaluations for Overall Quality of the Course and Overall Quality of the Instruction for those programs in which PSS faculty members participate. The means scores include all courses taught in a program, not just those courses taught by PSS faculty members. Overall means for the College of Agriculture and the University are provided for comparison.

	Program or Unit									
	ABT		NRC		PLS		College of Ag		University	
Quality of	Course	Instruction	Course	Instruction	Course	Instruction	Course	Instruction	Course	Instruction
Semester										
Fall 05	3.4	3.7	3.0	3.0	3.4	3.5	3.3	3.4	3.2	3.4
Spr 06	3.1	3.1	3.2	3.6	3.5	3.6	3.3	3.4	3.2	3.4
Fall 06	3.4	3.5	3.2	3.3	3.4	3.5	3.3	3.4	3.2	3.4
Spr 07	3.4	3.6	3.7	3.7	3.4	3.5	3.3	3.4	3.3	3.4
Fall 07	3.7	3.8	3.1	3.2	3.2	3.3	3.4	3.4	3.3	3.4
Spr 08	3.4	3.3	3.6	3.5	3.3	3.4	3.3	3.3	3.3	3.4
Fall 08	3.3	3.4	3.0	3.2	3.2	3.4	3.3	3.4	3.3	3.4
Spr 09	3.3	3.4	3.6	3.7	3.2	3.3	3.3	3.4	3.3	3.4
Fall 09	3.5	3.6	3.5	3.6	3.3	3.5	3.3	3.4	3.3	3.4
Spr 10	3.3	3.5	3.7	3.8	3.3	3.4	3.4	3.4	3.3	3.4
Fall 10	3.4	3.5	3.4	3.5	3.5	3.6	3.4	3.5	3.3	3.4

Appendix 8

Refereed journal publications since the previous review (2006-2010) by graduate students advised by faculty members in Plant and Soil Sciences							
Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Carter, Jessica	MS	CRSC	2009	Carter, J.M., G.E. Aiken, C.T. Dougherty, and F.N. Schrick. Steer responses to feeding soybean hulls and steroid hormone implantation on toxic tall fescue pasture. Journal of Animal Science 88(11):3759-3766. Published online: doi: 10.2527/jas.2009-2536.	2010	2.9	0
Deaton, Michael	PHD	CRSC	Current student	Deaton, M.T., and D.W. Williams. Overseeding and Trinexapac-Ethyl Effects on Tolerance to Simulated Traffic of Four Bermdagrass Cultivars Grown as a Sand-Based. Athletic Field & Horticulture Technology 20(4):724-729.	2010		
Jordan, Daniel	MS	CRSC	2010	Fan, Z.M., L. Yuan, D.B. Jordan, K. Wagschal, C. Heng, and J.D. Braker. Engineering lower inhibitor affinities in B-D-xylosidase. Applied Microbiology and Biotechnology 86:1099-1113.	2010	3.6	1
Hall, Sarah	PHD	CRSC	2011	Hall, S.L., C.D. Barton, and C.C. Baskin. Topsoil Seed Bank of an Oak-Hickory Forest in Eastern Kentucky as a Restoration Tool on Surface Mines. Restoration Ecology 18(6):834-842. Published online: doi: 10.1111/j.1526-100X.2008.00509.x.	2010	2.7	1
Cropper, Kenneth	MS	CRSC	Current Student	Williams, D.W., P.B. Burrus, and K.L. Cropper. Seeded bermudagrass tolerance to simulated athletic field traffic as affected by cultivars and trinexapac-ethyl. Horticulture Technology 20(3):533-538.	2010	1.0	2
Yang, Shengming	PHD	CRSC	2008	Yang S., F. Tang, M. Gao, H.B. Krishnan, and H. Zhu. *R* gene-controlled host specificity in the legume-rhizobia symbiosis. Proceedings of the National Academy of Science, USA 107(43):18735-40.	2010	10.6	3

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Bell, Stephen	PHD	PLPH	Current Student	Bell, S. and A.G. Hunt. The *Arabidopsis* ortholog of the 77 kD subunit of the polyadenylation Cleavage Stimulatory Factor is an RNA binding protein. FEBS Letters 584:1449-1454.	2010		
Mendu, Venugopal	PHD	PLPH	2008	Jian, X., V. Mendu, and G. Tang. An array platform for identification of stress-responsive miRNAs in plants, "Methods in Molecular Biology; Plant Stress Tolerance- Methods and Protocols" Methods in Molecular Biology. 639:253-69.	2010		
Kong, Que	PHD	PLPH	2009	Pattanaik, S., Q. Kong, D. Zaitlin, J.H. Werkman, C.H. Xie, B. Patra, and L. Yuan. Isolation and functional characterization of a floral tissue –specific R2R3MYB regulator from Tobacco. Planta 231:1061-1076.	2010	3.5	5
Werkman, Joshua	PHD	PLPH	2009	Pattanaik, S., Q. Kong, D. Zaitlin, J.H. Werkman, C.H. Xie, B. Patra, and L. Yuan. Isolation and functional characterization of a floral tissue –specific R2R3MYB regulator from Tobacco. Planta 231:1061-1076.	2010	3.5	5
Kong, Que	PHD	PLPH	2009	Pattanaik, S., J.H. Werkman, Q. Kong, and L. Yuan. Site-directed mutagenesis and saturation mutagenesis for the functional study of transcription factors involved in plant secondary metabolite biosynthesis. Metabolic Engineering of Plant Secondary Pathways, in Methods in Molecular Biology. 643:47-57.	2010		

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Werkman, Joshua	PHD	PLPH	2009	Pattanaik, S., J.H. Werkman, Q. Kong, and L. Yuan. Site-directed mutagenesis and saturation mutagenesis for the functional study of transcription factors involved in plant secondary metabolite biosynthesis. Metabolic Engineering of Plant Secondary Pathways, in Methods in Molecular Biology. 643:47-57.	2010		
Edwards, Jared	MS	PSSC	2008	Karathanasis, A.D., J. Edwards, and C.D. Barton. Manganese and Sulfate Removal from a Synthetic Mine Drainage through Pilot Scale Bioreactor Batch Experiments. Mine Water and the Environment. 29:144-153.	2010	0	0
Pike, Adam	MS	PSSC	2008	Pike, A.C., T.G. Mueller, A. Schörgendorfer, J.D. Luck, S.A. Shearer, and A.D. Karathanasis. Locating eroded waterways with United States Geologic Survey Elevation Data. Agronomy Journal 102:1269-1273.	2010	2.1	0
Siegrist, Jacob	MS	PSSC	2008	Siegrist, J.A., R.L. McCulley, L.P. Bush, and T.D. Phillips. Alkaloids may not be responsible for endophyte-associated reductions in tall fescue decomposition rates. Functional Ecology 24(2):460-468. Published online: doi: 10:1111/j.1365-2435.2009.01649.x.	2010	4.7	5
Nunez, Andres	PHD	SOSC	2008	D'Angelo, E.M., and A. Nunez. Effect of environmental conditions on polychlorinated biphenyl transformations and bacterial communities in a river sediment. Journal of Soils and Sediments 10:1186-1199.	2010	2.4	0

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Miller, Jarrod	PHD	SOSC	2008	Miller, J.O., A.D. Karathanasis, and O.B. Wendroth. In-situ colloid generation and transport in 30 year old mine soil profiles receiving biosolids. International Journal of Mining, Reclamation and Environment 24:95-108. Published online: doi: 10.1080/17480931003640207.	2010		
Judy, Jonathan	PHD	SOSC	Current Student	Unrine, J.M., O.V. Tsyusko, S.E. Hunyadi, J.D. Judy, and P.M. Bertsch. Effects of particle size on chemical speciation and bioavailability of Cu to earthworms (Eisenia fetida) exposed to Cu nanoparticles. Journal of Environmental Quality. Published online: doi: 10.2134/jeq2009.0387.	2010	2.7	7
Judy, Jonathan	PHD	SOSC	Current Student	Journal of Environmental Quality., O.V. Tsyusko, S.E. Hunyadi, J.D. Judy, and P.M. Bertsch. Effects of particle size on chemical speciation and bioavailability of Cu to earthworms (Eisenia fetida) exposed to Cu nanoparticles. Journal of Environmental Quality 39:6:1942-1953.	2010	2.7	7
Weand, Matthew	PHD	SOSC	2010	Weand, M., M.A. Arthur, G.M. Lovett, R.L. McCulley, and K.C. Weathers. Effects of tree species and N additions on forest floor microbial communities and extracellular enzyme activities. Soil Biology & Biochemistry 42:2161-2173.	2010	3.7	0
Jordan, Daniel	MS	CRSC	2010	Fan, Z.M., L. Yuan, D.B. Jordan, K. Wagschal, C. Heng, and J.D. Braker. Engineering lower inhibitor affinities in B-D-xylosidase. Applied Microbiology and Biotechnology. Published online: doi: 10.1007/s00253-009-2335-7.	2009	3.6	1
Knott, Carrie	PHD	CRSC	2007	Knott, C.A., D.A. Van Sanford, and E.J. Souza. Genetic Variation and the Effectiveness of Early-Generation Selection for Soft Winter Wheat Quality and Gluten Strength. Crop Science 49:113-119.	2009	2.1	3

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
King, Brian	PHD	CRSC	2011	Korenkov, V., B. King, K. Hirschi, and G.J. Wagner. Root-selective expression of AtCAX4 and AtCAX2 results in reduced lamina Cd in field grown Nicotiana tabacum L. Plant Biotechnology Journal 7:219-226.	2009	5.0	5
Li, Dandan	PHD	CRSC	2006	Kurepa J., S. Wang, Y. Li, D. Zaitlin, A.J. Pierce, and J. Smalle. Loss of 26S proteasome function leads to increased cell size and decreased cell number in Arabidopsis shoot organs. Plant Physiology 50:178-189.	2009	7.0	12
Li, Dandan	PHD	CRSC	2006	Li, D. and T.W. Pfeiffer. Three cycles of recurrent selection for altered recombination frequency in maize. Crop Science 49:473-482.	2009	2.1	0
Stefaniak, Thomas	PHD	CRSC	2008	Stefaniak, T.R., T.D. Phillips, C.A. Rodgers, R. VanDyke, and D.Williams. The inheritance of Cold Tolerance and Turf Traits in a Seeded Bermudagrass Population. Crop Sci. 49:1489-1495.	2009	2.1	0
Schwer, Laura	MS	CRSC	2011	Smith, S.R., L. Schwer, and T.C. Keene. Tall fescue toxicity for horses: literature review and Kentucky's successful pasture evaluation program. Forage and Grazinglands. Published online: doi:10.1094/FG-2009-1102-02-RV.	2009		
Fan, Cui	PHD	PLPH	2008	Chen, C., C. Fan, M. Gao, and H. Zhu. Antiquity and function of CASTOR and POLLUX, the twin ion channel-encoding genes key to the evolution of root symbioses in plants. Plant Physiology 149:306-317.	2009	7.0	17
Werkman, Joshua	PHD	PLPH	2009	Fan, Z.M, J.H. Werkman, and L. Yuan. Engineering a multifunctional hemicellulase. Biotechnology Letters 31:751-757.	2009	1.8	6

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Kong, Que	PHD	PLPH	2009	Fan, Z.M., K. Wagschal, C.C. Lee, Q. Kong, K.A. Shen, I.B. Maiti, and L. Yuan. The construction and characterization of two xylan-degrading chimeric enzymes. Biotechnology and Bioengineering 102:684-692.	2009	3.7	4
Meeks, Lisa	PHD	PLPH	2005	Meeks, L.R., B. Addepalli, and A.G. Hunt. Characterization of genes encoding poly(A) polymerases in plants: evidence for duplication and functional specialization. PLoS One 4, e8082. Published online: doi:10.1371/journal.pone.0008082.	2009		
Hill, Kristine	PHD	PLPH	2008	Nakaminami, K., K. Hill, S.E. Perry, N. Sentoku, J.A. Long, and D.T. Karlson. Arabidopsis Cold Shock Domain Proteins: Relationships to Floral and Silique Development. J. Exp. Botany 60:1047-1062.	2009	5.0	7
Zheng, Yumei	PHD	PLPH	2011	Zheng, Y., N. Ren, H. Wang, A.J. Stromberg, and S.E. Perry. 2009. Global Identification of Targets of the Arabidopsis MADS Domain Protein AGAMOUS-Like15. The Plant Cell 21:2563-2577.	2009	10.6	22
Edwards, Jared	MS	PSSC	2008	Edwards, J.D., C.D. Barton, and A.D. Karathanasis. A Small Scale Sulfate Reducing Bioreactor Mn Removal from a Synthetic Mine Drainage. Water, Air & Soil Pollution 203:267-275.	2009	2.0	2
Mijatovic, Blazan	MS	PSSC	2006	Hamilton, N.J., B. Mijatovic, T.G. Mueller, B.D. Lee, B.W. Kew, H. Cetin, and A.D. Karathanasis. Google Earth Dissemination of Soil Survey Derived Interpretations for Land-Use Planning. Journal of Extension. Published online: http://www.joe.org/joe/2009october/a3.php.	2009		
Shumaker, Paul	MS	PSSC	2006	Karathanasis, A.D., and P.D. Shumaker. Organic and inorganic phosphate interactions with soil hydroxyinterlayered minerals. Journal of Soil and	2009	2.4	1

				Sediments 9:501-510.			
Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Shumaker, Paul	MS	PSSC	2006	Karathanasis, A.D., and P.D. Shumaker. Preferential sorption and desorption of organic and inorganic phosphates by hydroxyinterlayered minerals. Soil Science 174:417-423.	2009	1.1	1
Pike, Adam	MS	PSSC	2008	Pike, A.C., T.G. Mueller, A. Schörgendorfer, S.A. Shearer, and A.D. Karathanasis. Erosion indices derived from terrain attributes using Logistic Regression and Neural Networks. Agronomy Journal 101:1068-1079.	2009	2.1	4
Siegrist, Jacob	MS	PSSC	2008	Siegrist, J.A., R.L. McCulley, L.P. Bush, and T.D. Phillips. Alkaloids may not be responsible for endophyte-associated reductions in tall fescue decomposition rates. Functional Ecology. Published online: doi:10.1111/j.1365-2435.2009.01649.x.	2009	4.7	5
Sanderfur, Brian	MS	PSSC	2001	Thompson, Y.L., B.C. Sandefur, A.D. Karathanasis, and E.M. D'Angelo. Redox Potential and Seasonal Porewater Biogeochemistry of Three Mountain Wetlands in Southeastern, Kentucky, USA. Aquatic Geochemistry 15:349-370.	2009	1.5	1
Morrison, Jesse	MS	PSSC	2008	Morrison, J.I., S.R. Smith, and G.E. Aiken, and L.M. Lawrence. Composition of horse diets on cool-season grass pastures using microhistological analysis. Forage and Grazinglands. Published online: doi:10.1094/FG-2009-0325-01-RS.	2009		
Tolson, Joshua	MS	PSSC	Current Student	Tolson, J., J.D. Green, and W. Witt. Integrated management strategies to reduce weed populations in pastures. North Central Weed Science Society Proceedings 64:79.	2009		

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Mubiru, Drake	PHD	SOSC	2001	Mubiru, D.N. and M.S. Coyne. Leguminous cover crops are more beneficial than natural fallows in minimally tilled Ugandan soils. Agronomy Journal 101:644-652.	2009	2.1	3
McClanahan, Linda	MS	CRSC	2007	Aiken, G.E., L.K. McClanahan, and F.N. Schrick, Steer responses to feeding soybean hulls on toxic tall fescue pasture. Professional Animal Scientist 24:399-403.	2008		
McClanahan, Linda	MS	CRSC	2007	Aiken, G.E., L.K. McClanahan, B.H. Kirch, and F.N. Schrick. Performance and physiology of steers following grazing of toxic tall fescue as influenced by feeding soybean hulls on pasture and post-graze steroid implantation. Professional Animal Scientist 24:392-398.	2008		
Johnson, Jennifer	PHD	CRSC	2010	Pena-Yewtukhiw, E.M., G.J. Schwab, J.H. Grove, L.W. Murdock and J.T. Johnson. Spatial analysis of early wheat canopy NDVI: Determining appropriate observation scale. Agronomy Journal 100:454-462.	2008	2.1	0
Knott, Carrie	PHD	CRSC	2007	Knott, C.A., D.A. Van Sanford, and E.J. Souza. Comparison of selection methods for the development of white-seeded lines from red x white soft winter wheat crosses. Crop Science 48:1807-1816.	2008	2.1	4
Jack, Anne	PHD	CRSC	Current Student	Lewis, R.S., A.M. Jack, J.W. Morris, V.M. Robert, L.B. Gaviliano, B. Siminszky, L P. Bush, A.J. Hayes, and R.E. Dewey. RNA interference (RNAi)-induced suppression of nicotine demethylase activity reduces levels of a keycarcinogen in cured tobacco leaves. Plant Biotechnology Journal 6:346-354.	2008	4.9	4
Li, Dandan	PHD	CRSC	2006	Li, D., T.W. Pfeiffer, and P.L. Cornelius. Soybean QTL for yield and yield components associated with	2008	2.1	4

				Glycine soja alleles. Crop Science 48:571-581.			
Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
McClanahan, Linda	MS	CRSC	2007	McClanahan, L.K., G.E. Aiken, and C.T. Dougherty. Case study: Influence of rough hair coats and progesterone in steroidal implants on the performance and physiology of steers grazing toxic tall fescue in the summer. Professional Animal Science 24:269-276.	2008		
Johnson, Jennifer	PHD	CRSC	2010	Pena-Yewtukhiw, E.M., G.J. Schwab, J.H. Grove, L.W. Murdock, and J.T. Johnson. Spatial analysis of early wheat canopy NDVI: Determining appropriate observation scale. Agronomy Journal 100:454-462.	2008	2.1	0
Hilker, Brian	PHD	PLPH	Current Student	Hilker, B.L., H. Fukushige, C. Hou, and D. Hildebrand. Comparison of Bacillus monooxygenase genes for unique fatty acid production. Progress in Lipid Research 47:1-14.	2008	11.7	3
Hill, Kristine	PHD	PLPH	2008	Hill, K., H. Wang, and S.E. Perry. A transcriptional repression motif in the MADS factor AGL15 is involved in recruitment of histone deacetylase complex components. The Plant Journal 53:172-185.	2008	7.3	20
Forbes, Kevin Meeks, Lisa Bandyopathy, Amrita Dampanaboina, Lavanya	PHD PHD MS PHD	PLPH PLPH CRSC PLPH	2005 2005 2009 Current Student	Hunt, A.G., R. Xu, B. Addepalli, S. Rao, K.P. Forbes, L.R. Meeks, D. Xing, M. Mo, H. Zhao, A. Bandyopathy, L. Dampanaboina, A. Marion, C. Von Lanken, and Q.Q.Li. Arabidopsis mRNA polyadenylation machinery: Comprehensive analysis of protein-protein interactions and gene expression profiling. BMC Genomics 9:220.	2008	4.2	14

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Mendu, Venugopal	PHD	PLPH	2008	Tang, G., X. Tang, V. Mendu, X. Tang, X. Jia, Q.-J. Chen, and L. He. The art of microRNA: Various strategies leading to gene silencing via an ancient pathway. BBA-Gene Regulatory Mechanisms 1779:655-662.	2008		
Hill, Kristine	PHD	PLPH	2008	Thakare, D., W. Tang, K. Hill, and S.E. Perry. The MADS-domain transcriptional regulator AGAMOUS-LIKE15 promotes somatic embryo development in Arabidopsis and soybean. Plant Physiology 146:1663-1672.	2008	7.0	12
Zheng, Yumei	PHD	PLPH	2011	Zheng, M.Q., Y.R. Zheng, G.S. Zhou, Y.Z. Wu, P. An, C.C. Baskin, and J.M. Baskin. Effects of watering regime and depth of burial on seedling emergence of four dominant psammophytes in the Mu Us sandy land, Inner Mongolia, China, and relevance to revegetation of a desertified region. Annals of Applied Biology. Published online: doi: 10.111/j.12744-7348 2008.009275.x	2008	2.0	1
Flynn, Scott	MS	PSSC	2006	Flynn, E.S., C. T. Dougherty, and O. Wendroth. Assessment of pasture biomass with the normalized difference vegetation index from active ground-based sensors. Agronomy Journal. 100: 114-121.	2008	2.1	10
Sandefur, Brian	MS	PSSC	2001	Thompson, Y.L., B.C. Sandefur, A.D. Karathanasis, and E.M. D'Angelo. Redox potential and seasonal porewater biogeochemistry of three mountain wetlands in southeastern Kentucky, USA. Aquatic Geochemistry. Published online: doi: 10.1007/s10498-008-9042-3.	2008	1.5	1
Hancock, Dennis	PHD	CRSC	2006	Hancock, D.W., and C.T. Dougherty. Relationships between blue- and red-based vegetation indices and leaf area and yield of alfalfa. Crop Sci. 47:2547-2556.	2007	2.1	1
Shepherd, Ryan	PHD	PLPH	2004	Shepherd, R.W., and G.J. Wagner. Phylloplane proteins: Emerging defenses at the aerial frontline?	2007	10.7	11

				Trends in Plant Sciences 12:51-56.			

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Chakrabati, Manohar	PHD	PLPH	2010	Chakrabarti, M., K.M. Meekins, L.B. Gavilano, and B. Siminszky. Inactivation of the cytochrome P450 gene CYP82E2 by degenerative mutations was a key event in the evolution of the alkaloid profile of modern tobacco. New Phytologist 175:565-574.	2007	6.6	4
Shepherd, Ryan	PHD	PLPH	2004	Kroumova, A.B., R.W. Shepherd, and G.J. Wagner. Impacts of T-phylloplanin gene knockdown and of Heilanthus and Datura phylloplanins on Peronospora tabacina sporegermination and disease potential. Plant Physiology 144:1843-1851.	2007	7.0	4
Suttipanta, Nitima	PHD	PLPH	2005	Suttipanta, N., S. Pattanaik, S. Gunjan, J. Littleton, and L. Yuan. Promoter analysis of the Catharanthus roseus geranial 10-hydroxylase gene involved in terpenoidindole alkaloid biosynthesis. Biochemica et Biophysica Acta 1769:139-148.	2007		
Greenhagen, Bryan	PHD	PLPH	2003	Takahashi, S., Y.S. Yeo, Y.X. Zhao, P.E. O'Maille, B.T. Greenhagen, J.P. Noel, R.M. Coates, and J. Chappell. Functional characterization of premnaspirodiene oxygenase, a cytochrome P450 catalyzing regio- and stereo-specific hydroxylations of diverse sesquiterpene substrates. Journal of Biological Chemistry 282:31744-31754.	2007	5.5	12
Zhuang, Xun	PHD	PLPH	Current Student	Tang, G., G. Galili, and X. Zhuang. RNAi and microRNA: Breakthrough technologies for the improvement of plant nutritional value and metabolic engineering. Metabolomics 3:357-369.	2007	3.6	8
Zhuang, Xun	PHD	PLPH	Current Student	Tang, X., J. Gal, X. Zhuang, W. Wang, H. Zhu, and G. Tang. A simple array platform for microRNA analysis and its application in mouse tissues. RNA 13:1803-1822.	2007		

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Gaffney, Bobby	PHD	PLPH	Current Student	Wang, W.-X., B. Gaffney, A.G. Hunt, and G. Tang. MicroRNAs (miRNAs) and plant development. Encyclopedia of Life Sciences, John Wiley & Sons Ltd. Published online: www.els.net. doi: 10.1002/9780470015902.a0020106.	2007		
Lee, Sungboem	PHD	PLPH	2008	Yang, P., J. Smalle, S. Lee, N. Yan, T.J. Emborg, and R.D. Vierstra. Ubiquitin C-terminal hydrolases 1 and 2 affect shoot architecture in Arabidopsis. The Plant Journal 51:441-457.	2007	7.3	12
Yang, Shengming	PHD	PLPH	2008	Yang, S., M. Gao, S. Deshpande, S. Lin, B.A. Roe, and H. Zhu. Genetic and physical localization of an anthracnose resistance gene in Medicago truncatula. Theoretical and Applied Genetics 116:45-52.	2007	3.8	4
Flynn, Scott	MS	PSSC	2006	Flynn, E.S., C.T. Dougherty, and O. Wendroth. Assessment of grassland condition with the normalized difference vegetation index. Agronomy Journal 100:114-121.	2007	2.1	10
Pallikonda, Praveen	MS	PSSC	2006	Kumudini, S., P. Pallikonda, and C. Steele. Photoperiod and E-genes directly influence the duration of soybean reproductive development. Crop Science 47:1510-1517.	2007	2.1	3
Diaz-Zorita, Martin	PHD	SOSC	2001	Diaz-Zorita, M., J.H. Grove, and E. Perfect. Sieving duration and sieve loading impacts on dry soil fragment size distributions. Soil Tillage Research 94:15-20.	2007	2.3	3

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Yang, Yang	PHD	SOSC	2009 (statistics)	Yang, Y., J.M. Baskin, C.C. Baskin, Y. Tang, and M. Cao. Ecology of seed germination of eight non-pioneer tree species from a seasonal tropical rain forest in southwest China. Published online: Plant Ecology. doi: 10.1007/s11258-007-9355-0.	2007		
Stefaniak, Thomas	PHD	CRSC	2008	Stefaniak, T.R., D.L. Hyten, V.R. Pantalone, A. Klarer, and T.W. Pfeiffer. Soybean cultivars resulted from more recombination events than unselected lines in the same population. Crop Science 46:43-51.	2006	2.1	4
Verges, Virginia	MS	CRSC	2004	Verges, V.L., D.A. Van Sanford, and G. Brown-Guedira. Heritability estimates and response to selection for Fusarium head blight resistance in segregating populations of soft red winter wheat. Crop Science 46:1587-1594.	2006	2.1	5
Forbes, Kevin	PHD	PLPH	2005	Forbes, K.P., B. Addepalli, and A.G. Hunt. An Arabidopsis Fip1 homologue interacts with RNA and provides conceptual links with a number of other polyadenylation factor subunits. Journal of Biological Chemistry 281:176-186.	2006	2.2	19
Greenhagen, Bryan	PHD	PLPH	2003	Greenhagen, B.T., P.E. O'Maille, J.P. Noel, and J. Chappell. Identifying and manipulating structural determinates linking catalytic specificities in terpene synthases. Proceedings of the National Academy of Sciences USA 103:9826-9831.	2006	10.6	48
He, Yuehui	PHD	PLPH	2001	Lin, L., M. Cao, Y. He, J.M. Baskin, and C.C. Baskin. Nonconstituent species in soil seed banks as indicators of anthropogenic disturbance in forest fragments. Canadian Journal of Forest Research 36:2300-2316.	2006	2.0	1

Student	Degree	Program	Degree Year	Publication citation	Year	Journal I.F.	Times cited
Kong, Que	PHD	PLPH	2009	Pattanaik, S., C.H. Xie, Q. Kong, K.A. Shen, and L. Yuan. Directed evolution of plant basic helix-loop-helix transcription factors for the improvement of transactivational properties. Biochimica et Biophysica Acta 1759:308-318.	2006		
Gandhapudi, Siva	MS	PSSC	2009	Gandhapudi, S.K., M.S. Coyne, E.M. D'Angelo, and C.J. Matocha. Potential nitrification in alum-treated soil slurries amended with poultry manure. Bioresource Technology 97:664-670.	2006	5.0	5
Johnson, Carey	MS	PSSC	2002	Karathanasis, A.D., and C. Johnson. Stability and transportability of biosolid colloids through undisturbed soil monoliths. Geoderma 130:334-345.	2006	2.8	4
Johnson, Carey	MS	PSSC	2002	Karathanasis, A.D., and C. Johnson. Subsurface transport of Cd, Cr, and Mo, mediated by biosolid colloids. Science of the Total Environment 354:157-169.	2006	3.4	10
Makris, Konstantinos	MS	PSSC	?? (MBA 2007)	Makris, K.C., J.H. Grove, and C.J. Matocha. Colloid-mediated vertical phosphorus transport in a waste-amended soil. Geoderma 136:174-183.	2006	2.8	4
Pike, Adam Mijatovic, Blazan	MS MS	PSSC PSSC	2008 2006	Pike, A.C., T.G. Mueller, B. Mijatovic, B.K. Koostra, M.M. Poulette, R.M. Prewitt, and S.A. Shearer. Topographic indices: Impact of data source. Soil Science 171:800-809.	2006	1.1	2
Flynn, Scott	MS	PSSC	2006	Flynn, E.S., C.T. Dougherty, and B.K. Koostra. GPS-enabled rising plate meter with data logging capability. Forage and Grazinglands. Published online: doi:10.1094/FG-2006-0825-01-BR.	2006		

Refereed proceedings and book chapter publications since the previous review (2006-2010) by graduate students advised by faculty members in Plant and Soil Sciences					
Student	Degree	Program	Degree Year	Publication citation	Year
Owens, Troye Finneseth, Cindy	MS PHD	PSSC CRSC	2011 2010	Owens, H.T., C.H. Finneseth, T.M. Tillery, and T.D. Phillips. Germination rate and seedling vigour of tall fescue as affected by endophyte status and seed density. pp. 271-274. IN: A.J. Popay and E.R. Thom, ed. 6th International Symposium on Fungal Endophytes of Grasses. Grassland Research and Practice Series 13. New Zealand Grassland Association, Christchurch, New Zealand, March 25-28.	2007
Morrison, Jesse	MS	PSSC	2008	Morrison, J.I., S.R. Smith, G.E. Aiken, and C. Huo. Using microhistological techniques to predict botanical composition of horse diets on cool-season grass pasture. Proceedings, Joint IGC/IRC International Meetings, Hohhot, Inner Mongolia, China, June 29-July 5. China Grassland Society, Beijing, China.	2008
Morrison, Jesse	MS	PSSC	2008	Morrison, J.I., S.R. Smith, and G.E. Aiken. Using microhistological techniques to predict botanical composition of horse diets on cool-season grass pasture. Proceedings, Joint AFGC/SRM Annual Meeting, Louisville, Ky., Jan. 26-31. American Forage and Grassland Council, Chicago, Ill.	2008
Probst, Adam	MS	PSSC	2008	Probst, T.A., and S.R. Smith. Harvest frequency effects on yield, quality, and regrowth rate among new alfalfa cultivars. Proceedings, Joint AFGC/SRM Annual Meeting, Louisville, Ky., Jan. 26-31. American Forage and Grassland Council, Chicago, Ill.	2008

Student	Degree	Program	Degree Year	Publication citation	Year
Miller, Jarrod	PHD	SOSC	2008	Miller, J.O., A.D. Karathanasis, O.O. Wendroth, C.J. Matocha, and C.D. Barton. *In situ* colloid mobilization within biosolid amended soils following coal mine reclamation. Proceedings, National Ground Water Association/United States Environmental Protection Agency Remediation of Abandoned Mine Lands Conference (No. 5019), Denver, Colo.	2008
Keene, Thomas Probst, Adam	MS MS	PSSC PSSC	Current Student 2008	Smith, S.R., T.C. Keene, A. Probst, and M.D. Montross. Biomass production on farms in the eastern United States. Proceedings, Joint IGC/IRC International Meetings, Hohhot, Inner Mongolia, China, June 29-July 5. China Grassland Society, Beijing, China.	2008
Saphangthong, Thatsaka Fryman, Daisy	PHD MS	CRSC PSSC	2008 2009	Witt, W.W., M.P. Blair, T. Saphangthong, and D.M. Fryman. Weed management in horse pastures following renovation. pp. 14. Proceedings, 5th International Weed Science Congress, Vancouver, British Columbia, Canada, June 23-27.	2008
Carter, Sara	MS	PSSC	2007	Carter, S.K., C.H. Slack, and H.A. Flanigan. Optimum GAT corn in Kentucky. North Central Weed Science Society Proceedings 64:13.	2009
Edwards, Megan	MS	CRSC	2011	Edwards, M.E., J.D. Green, and W.W. Witt. Effect of Herbicide application timing on spiny amaranth. North Central Weed Science Society Proceedings 64:80.	2009
Tolson, Joshua	MS	PSSC	Current Student	Tolson, J., J.D. Green, and W. Witt. Integrated management strategies to reduce weed populations in pastures. North Central Weed Science Society Proceedings 64:79.	2009

Student	Degree	Program	Degree Year	Publication citation	Year
Schwer, Laura	MS	CRSC	2011	Schwer, L.J., and S.R. Smith. Wildlife habitat potential of various agricultural land uses: switchgrass managed for biomass, no-till and conventional till corn fields, and cool season grass hay fields. IN: Proceedings of the AFGC Annual Meeting, Springfield, MO, June 21-23. America Forage and Grassland Council. Berea, KY.	2010
Niehaus, Thomas	PHD	PLPH	Current Student	Wu, S., T. Niehaus, S. Kinison, S. Husodo, R. Williams, and J. Chappell. Engineering High Value Oil Production. IN: B. Siminszky, ed. *Tobacco*. Proceedings, 64th Tobacco Science Research Conference – *Tobacco Research in the Era of Biotechnology and Genomics.*	2010
Schwer, Laura	MS	CRSC	2011	Schwer, L.J., and S.R. Smith. Wildlife habitat potential of various agricultural land uses: switchgrass managed for biomass, no-till and conventional till corn fields, and cool season grass hay fields. IN: Proceedings of the AFGC Annual Meeting, Springfield, MO, June 21-23. America Forage and Grassland Council. Berea, KY.	2010
Niehaus, Thomas	PHD	PLPH	Current Student	Wu, S., T. Niehaus, S. Kinison, S. Husodo, R. Williams, and J. Chappell. Engineering High Value Oil Production. IN: B. Siminszky, ed. *Tobacco*. Proceedings, 64th Tobacco Science Research Conference – *Tobacco Research in the Era of Biotechnology and Genomics.*	2010
Gaffney, Bobby	PHD	PLPH	Current Student	Wang, W.-X., B. Gaffney, A.G. Hunt, and G. Tang. MicroRNAs (miRNAs) and plant development. Encyclopedia of Life Sciences, John Wiley & Sons Ltd. Published online: www.els.net. doi: 10.1002/9780470015902.a0020106.	2007

Appendix 9

Service in and awards from national scientific societies 2007-2010			
Society Service 2009-2010	Society Award 2009-2010	Society Service 2007-2008	Society Award 2007-2008
Bailey – Chair CORESTA TSNA task force	Barrett – Fellow of the Weed Science Society of America - 2009	Bailey – Chair CORESTA TSNA task force	Bertsch – Fellow International Union of Pure and Applied Chemistry – 2008
Barrett – Vice-president Weed Science Society of America - 2009	Bush – Lifetime Achievement Award Tobacco Science Research Conf. - 2009	Green - Secretary/Treasurer North Central Weed Science Society - 2007	Wendroth – Fellow of the American Society of Agronomy
Barrett – President elect Weed Science Society of America - 2010	Chappell – Fellow American Association for the Advancement of Science	C. Lee – American Society of Agronomy Division A-4 2008	
B. Lee – Chair Division S9 Soil Science Society of America	Grabau – NACTA – Teaching Fellow Award	Phillips – Secretary S-009 Regional Technical Committee 2008	
C. Lee – American Society of Agronomy Division A-4 - 2009	Green – Fellow North Central Weed Science Society	Phillips – President S-009 Regional Technical Committee 2007	
McCulley – President of the Rangeland Ecology section of the Ecological Society of America – 2009/2010	Martin – American Society of Agronomy Extension Award-2009	Smith – Secretary American Forage and Grassland Council	
Pearce – Chair: 44th Tobacco Workers' Conference	McNear – Presidential Early Career Award for Scientists and Engineers (PECASE) - 2010	Unrine –Advisory Group Steering Committee – Society of Environmental Toxicology and Chemistry	
Phillips – Secretary S-009 Regional Technical Committee - 2009	Schwab – American Society of Agronomy – Educational Materials Award - 2009	Williams - Chair, Southern Region Extension and Research Activity Group (SERA IEG – 25), 2007	

Phillips – President S-009 Regional Technical Committee - 2010	Wendroth – Fellow of the Soil Science Society of America - 2009	Williams - Chair, National Turfgrass Evaluation Program, 2007	

Service in and awards from national scientific societies 2007-2010			
Society Service 2009-2010	Society Award 2009-2010	Society Service 2007-2008	Society Award 2007-2008
Smith – Vice President American Forage and Grassland Council – 2009/2010	Witt – Southern Weed Science Society – Outstanding Educator Award - 2009		
Unrine –Advisory Group Steering Committee – Society of Environmental Toxicology and Chemistry			
Williams – Chair Crop Science Society of America Division C-5 Turfgrass Science			

Faculty members serving on editorial boards of scientific journals 2007-2010	
Editor – 2009-2010	Editor – 2007-2008
Bertsch – Associate Editor Vadose Zone Journal	Bertsch – Associate Editor Vadose Zone Journal
Bush – Editorial Board Beitrage Takforschung	Bush – Editorial Board Beitrage Takforschung
Chappell – Editorial Board Journal of Biological Chemistry	Chappell – Editorial Board Journal of Biological Chemistry
Chappell – Decision editor Plant Physiology	Chappell – Special Issue Editor Plant Biotechnology
Coyne – Editorial Board Applied Soil Ecology	Coyne – Editorial Board Applied Soil Ecology
Coyne – Editorial Board Egyptian Journal of Microbiology	Hildebrand – Associate Editor Journal American Oil Chemists Society
Hildebrand – Associate editor Journal American Oil Chemists Society	Hildebrand – Associate Editor Journal of New Biotechnology
Hildebrand – Editor Journal of New Biotechnology	Mueller – Associate Editor Agronomy Journal
Karathanasis – Editor Journal Applied Environmental Soil Science	Mueller – Associate Editor Crop Science
	Schwab – Associate Editor Journal of Soil Science Society
Lee, B. – Associate editor Soil Science Society of America Journal	Smith – Technical Editor Forage and Grazinglands Journal
McCulley – International Board of Advisors to the Editors New Phytologist	
Mueller – Associate Editor Journal of Soil and Water Conservation and Management	Wendroth – Technical Editor Agronomy Journal
Mueller – Associate Editor Agronomy Journal	Wendroth – Associate Editor Soil Science Society of America Journal
Mueller – Associate Editor Crop Science	Wendroth – Associate Editor Journal of Environmental Quality
Perry – Editor Methods in Molecular Biology	
Smith – Technical Editor Forage and Grazinglands Journal	Wendroth – Associate Editor Agronomy Journal
Tang – Associate editor CMB-Plant Biology	
Wendroth – Technical Editor Agronomy Journal	Wendroth – Associate Editor Vadose Zone Journal
Wendroth – Associate Editor Soil Science Society of America Journal	Wendroth – Editorial Board Journal of Plant Nutrition and Soil Science
Wendroth – Associate Editor Vadose Zone Journal	Wendroth – Editorial Board Soil & Tillage Research
Wendroth – Editorial Board Journal of Plant Nutrition and Soil Science	Williams - Associate Editor Applied Turfgrass Science (Plant Management Network)
Wendroth – Editorial Board Soil & Tillage	

Research	
Williams - Associate Editor Applied Turfgrass Science (Plant Management Network)	
Yuan – Editor Methods in Molecular Biology	

Appendix 10

Appendix 11 Faculty CVs

Glen E. Aiken
Research Animal Scientist/Agronomist, USDA-ARS Forage-Animal Production Research Unit

Experience
Adjunct Professor, Plant and Soils Department, University of Kentucky, Lexington, KY, 2009-present
GS-14, Animal Scientist, USDA, ARS, Lexington, KY, 2007-present
Adjunct Associate Professor, Plant and Soils Department, University of Kentucky, Lexington, KY, 2004-2009
GS-13, Agronomist, USDA, ARS, Booneville, AR, Lexington, KY 1999-07
Adjunct Assistant Professor, University of Arkansas, Fayetteville, AR 1993-03
GS-12, Agronomist, USDA-ARS, Booneville, AR 1992-1999
Postdoctoral Research Associate, Texas A&M University, College Station, TX. 1991-92
Postdoctoral Research Associate, Auburn University, Auburn, AL 1990-91

Education

Ph.D. University of Florida, 1989, Gainesville, FL
M.S. Texas A&M University, 1986, College Station, TX
B.S. Texas A&M University, 1979, College Station, TX

Current Position, Research Animal Science**/Agronomy**

I am currently a Research Animal Scientist at the Forage-Animal Production Research Unit (FAPRU), Lexington, KY, and have been in this position since June of 2003. My research is in direct support of NP 101- Food Animal Production and NP 205-Rangeland, Pasture, and Forages. Further, I am Lead Scientist over a complex (molecular bench to systematic field approaches) and highly integragted NP 101 Project Plan entitled "*Optimizing the Biology of the Animal-Plant Interface for Improved Sustainability of Forage-Based Animal Enterprises*". As Lead Scientist, I coordinate the research efforts of 17 principal investigators for a total of 4.9 full time equivalents under this project plan (Note: this is a collaborative effort between FAPRU and the University of Kentucky). The ARS Unit's mission is to improve the productivity, profitability, competitiveness, and sustainability of forage-based livestock enterprises within the transition zone of the Eastern and Midwestern United States. My research covers a broad area of research requiring a systematic approach of a series of related forage and livestock studies to improve production efficiency as well as product quality and

safety. Research results provide new knowledge and technology for the American cattle industry. I also am responsible for purchasing and management of calves used in grazing and controlled physiology experiments. My Research Leader has further tasked me with outreach activities to transfer technology developed by FAPRU and collaborators to livestock producers via direct presentations and demonstrations to producers.

Honors and Awards

Alpha Zeta, 1977
Gamma Sigma Delta, 1988
Phi Kappa Phi, 1989
Early-Career Award for Research from the Southern Branch of the American
Society of Agronomy, 1998
Research accomplishment was included in NP-205 submission to Congress for FY01.
Merit Award from the American Forage and Grassland Council in recognition of research accomplishments, 2002
Elected Fellow, American Society of Agronomy, 2006
Fellowship from the Organization for Economic and Cooperative Development for travel to New Zealand to conduct collaborative research with AgResearch Ltd. scientists, 2009
Elected Fellow, Crop Science Society of America, 2009

Professional Memberships

American Society of Agronomy (1988 - present) Crop
Science Society of America (1988 - present)
American Society of Animal Science (1988 - present)
American Registry of Professional Animal Scientists (1996 - present)
American Forage and Grassland Council (1989 - present)
Kentucky Forage and Grassland Council (2004 - present)
Kentucky Cattlemen Association (2004 - present)

Offices and Committee Assignments

Forage, Grassland and Range Resource Committee, American Society of Agronomy, ACS 285, 1994-97.
Research Committee, American Forage and Grassland Council, 1994-97.
Board Member of Arkansas Forage and Grasslands Council, 1997-98.

Program Chair for Forages and Grazing Lands Division (C06) Crop Science Society of America, 2004.
Board of Directors of the Crop Science Society of America, 2004.
Coordinated the Bob Barnes Graduate Oral Paper Competition, Division C06, Crop Science Society of America, 2004-2006.
Forage, Pastures and Rangeland Committee of the American Society of Animal Science, 2004-2007.
Program Chair of the Utilization Workgroup for the Southern Pasture and Forage Crop Improvement Conference in Philadelphia, MS, 2005.
Associate Editor of **Crop Science** (Forages and Grazing Lands Division) for two terms
1999-2001; 2002-04.
Technical Editor of **Crop Science** (Forages and Grazing Lands Division), 2004-2007.
Editorial Board for **Professional Animal Scientist** for two terms, 2002-04, 2004-2006.
ACS836 Biosecurity Committee, Agronomy, Crop, and Soil Tri-Societies, 2006-present
ACS836 Committee Chair, 2007-2008.
C536.1 Rapid Response Team, Crop Science Society of America, 2007-2010
Chair of Southern Pasture and Forage Crop Improvement Conference, 2008-2009
Board member for Kentucky Forage & Grassland Council, 2012-2014.
Technical Editor for **Forage & Grazinglands** E-Journal, 2010-present
Editorial Board for **Journal of Animal Science**, 2012-2013.
American Society of Agronomy A441 Fellows Committee (2012)
Crop Science Society of America C455 Fellows Committee (2012)

Publications

Authored or Coauthored:
74 referred journal articles
47 international or national conference proceeding articles
19 regional or state conference proceeding articles
14 technical bulletins
7 popular press articles

William A. (Andy) Bailey

Faculty Positions

Assistant Extension Professor, Department of Agronomy, Univ. of Kentucky, 2002

Associate Extension Professor, Department of Plant & Soil Sciences, Univ. of Kentucky, 2008

Title/DOE: Dark Tobacco Ext. Specialist; 75% Univ. of KY/25% Univ. of TN; 75% Extension, 25% Research

Education

B.S. North Carolina State University, 1997, Agronomy

M.S. North Carolina State University, 1999, Crop Science

Ph.D. Virginia Tech, 2002, Plant Pathology, Physiology, and Weed Science

Program Description

Extension

My extension program involves traditional outreach methods such as numerous annual county grower meetings in nearly every county where dark tobacco is produced in KY and TN, major tradeshow and educational events at Springfield, TN and Murray, KY, annual field days throughout the dark tobacco region of KY and TN, and on-farm trials and demonstrations throughout this region. I have conducted over 90 replicated on-farm trials since 2002 in collaboration with county agents and growers, and I have made presentations in over 200 grower meetings and field days. In addition, I have adopted electronic media resources in my extension program by creating and maintaining the dark tobacco website (ces.ca.uky.edu/darktobacco) as well as the dark tobacco agent's website (ces.ca.uky.edu/darktobacco/Agent.htm). I have also been heavily involved in agent training, presenting at least one agent training each year. In addition, I have made over 40 invited presentations to industry. A large part of my extension responsibility is also devoted to writing extension publications, and I have written 17 numbered extension publications, 9 extension fact sheets, and over 40 popular press articles. The most significant extension publication that I have been involved in has been the KY & TN Tobacco Production Guide, which is updated every two years with input from myself and 20 other faculty working with tobacco at the University of KY and the University of TN.

Research

Major focuses of my research program includes evaluation of variety performance, pest control, fertility, topping and sucker control, conservation tillage with special emphasis on strip-tillage, and standard and alternative fire-curing methods aimed at maintaining quality and reducing TSNA. I have received industry funding for each of these areas of research and much of this work has resulted in revised recommendations and new

product registrations. TSNA reduction in dark fire-cured tobacco has resulted in modified and alternative fire-curing methods and a portion of this research has resulted in the issue of a U.S. patent from representatives of Swisher International, Inc and myself. Another project that has been initiated recently involves use of mechanical harvest techniques for dark tobacco. Although dark tobacco is much less conducive to mechanical harvest than burley, preliminary results suggest that there may be some potential for mechanical dark tobacco harvest depending on variety and method used. In addition to what I believe is an extensive research program, I have also tried to be as involved as possible in professional conferences devoted to tobacco production. I have been active in the CORESTA international tobacco congress since 2003 and with TSNA reduction being one of my major research focuses, I agreed to chair the CORESTA sub-group for TSNA in 2008. My involvement in chairing this subgroup has allowed me to interact with other tobacco researchers internationally that also work with TSNA. I have also created and maintain a webpage for the CORESTA sub-group for TSNA that illustrates the objectives and accomplishments of the group and allows access to reports and other important sub-group documents.

Honors and Awards

2007 High Impact Research/Extension Program Award, University of Kentucky College of Agriculture, presented by University of Kentucky Research Office.

2007 Outstanding New Extension Specialist Award (Faculty), University of Kentucky College of Agriculture, presented by Kentucky Association of State Extension Professionals.

2011 Outstanding Specialist Early Career Award, presented by Kentucky Association of County Agricultural Agents.

Recent Refereed Journal Articles (published since 2003, 20 additional for career)

Koepke-Hill, R. M., G. R. Armel, K. W. Bradley, W. A. Bailey, H. P. Wilson, and T. E. Hines. 2011. Evaluation of flufenacet plus metribuzin mixtures for control of Italian ryegrass in wheat. Weed Technol. *In press.* Doi: 10.1614/WT-D-10-00149.1.

Bailey, W. A. 2007. Dark tobacco (*Nicotiana tabacum*) tolerance to trifloxysulfuron and halosulfuron. Weed Technol. 21(4):1016-1022.

Bailey, W. A., L. R. Fisher, J. W. Wilcut, W. D. Smith, and V. B. Langston. 2004. Tobacco (*Nicotiana tabacum* L.) tolerance to pre-transplant and postemergence applications of diclosulam. Tobacco Sci. (2001) 45:26-29.

Published 93 abstracts and 5 proceedings papers for scientific meetings for career

Intellectual Property: Patent Applications Published

Terry Thomas, John Brandon, William A. Bailey, and Thomas A. Losty. Method for reducing nitrosamines in tobacco. U.S. Provisional Patent Application (No. 60/753,683) filed with U.S. Patent and Trademark Office on December 22, 2005. Joint applicants were University of Kentucky Research Foundation and Swisher International, Inc. U.S. Patent application filed December 13, 2006. Patent publication number 20070149408/US-A1. Patent publication date June 28, 2007. NDN 041-0642-0000-3

Research and Extension Project Grants

$1,332,373 in total funding, $1,259,373 to my program since 2002
Major funding sources have been from tobacco manufacturers and dealers and the fertilizer and agrochemical industries.

International, National, and Regional Service (selected)

International: CORESTA TSNA Sub-Group, chairman; CORESTA IPM Task Force, weeds section chairman

National: Tobacco Workers Conference: Burley Variety Evaluation committee, Host committee, Program committee, Awards committee, and Resolutions committees

Regional: Advisor, Philip Morris USA and U.S. Smokeless Tobacco Grower Councils

MICHAEL BARRETT

Professor, Weed Science

EDUCATION:

2002 Participated in ESCOP/ACOP Leadership Training Program.
1992 Six month sabbatical leave in the laboratory of Dr. Francis Durst at the Insitut de Biologie Moléculaire des Plantes of the Université Louis Pasteur Strasbourg, France.
1980 University of California, Davis, CA. Ph.D. in Botany
1976 University of Connecticut, Storrs, CT. M.S. in Plant Science - Agronomy
1974 University of Massachusetts, Amherst, MA. B.S. in Plant and Soil Science.

PROFESSIONAL EXPERIENCE:

7/2009 – Present Plant and Soil Sciences Department, University of Kentucky
Professor, Weed Science - Plant Physiology: 70% R, 30% T
3/1999 – 7/2009 Plant and Soil Sciences Department, University of Kentucky
Professor and Department Chair; 100% A
Agronomy Department, University of Kentucky
5/1997 – 3/1999 Professor, Weed Science - Plant Physiology: 80% R, 10% T, 10% A
5/1989 – 4/1997 Associate Professor, Weed Science - Plant Physiology: 90% R, 10% T
5/1983 - 4/1989 Assistant Professor, Weed Science - Plant Physiology: 90% R, 10% T
5/1980 - 5/1983 Department of Crop and Soil Sciences, Michigan State University
Assistant Professor and Extension Specialist, Weed Science: 75% E, 25% R

PROGRAM DESCRIPTION

Since stepping down as Department Chair in July 2009, after 10 years without a research or teaching program, my program continues to evolve as I work to reestablish myself in these areas, especially in research. Generally, my program is incorporating elements of my past research on weed management with herbicides, both practical applications and the physiology

of herbicide selectivity and mechanism-of-action. One major focus area, one that is new to me, is weed management in turf. I am conducting both applied studies in turf, supported by industry grants, and I have a Ph.D. student working on weed biotypes and their differential response to management approaches. I have established collaborations with faculty at the Universities of Georgia, Virginia Tech and Tennessee on behavior of herbicides in turf species. I have also joined a multi-state project looking at sustainability of turf management practices. In addition, I am leading and collaborating on forage projects, hopefully that will be supported by Specific Cooperative Agreement funds, to develop a 2,4-D tolerant red clover variety and to evaluate the safety for pregnant mares of a tall fescue variety with a "friendly" endophyte. I am also collaborating on projects to develop herbicide resistance and weed management approaches for crops, including tobacco, for industrial/pharmaceutical purposes. I am preparing a proposal for the Kentucky Tobacco Research and Development Center in this area. I also try to serve the Weed Science extension faculty and I have one project in wheat underway to explain some of the field observations that they have made. In teaching, I assumed responsibility for the Fall Semester sections of the largest course (approximately 135 students) in the Department, PLS 104 Plants, Soils and People, in 2009. This course will be completely revamped in 2012 for inclusion in the UK Core.

PROFESSIONAL RECOGNITION:

Named a Fellow of the Weed Science Society of America - 2009

Elected Vice-President for the Weed Science Society of America – 2009 (serving as President in 2011 - 2012)

Kentucky Forage and Grasslands Council Public Service Award – 2006

Elected Member at Large to the Board of Directors for the Weed Science Society of America - 2005

Selected for the "Outstanding Research Award" from the Weed Science Society of America-2001.

Named a Fellow of the North Central Weed Science Society, 1999.

Panel Member, National Research Initiative Competitive Grants Program, Weed Science 1997 and Assessing Pest Control Strategies Area 1995.

Selected for the "Outstanding Young Weed Scientist Award" from the Weed Science Society of America-1992.

Member, Executive Committee and Board of Directors for the North Central Weed Science Society. 1990-1999.

Editor, North Central Weed Science Society Research Report 1990-1999.

Associate Editor for Weed Science. 1989-1992.

PUBLICATIONS and PATENTS (selected examples, 1-graduate student, 2-post-doc):

Ferhatoglu[1], Y. and M.Barrett. 2006. Studies of clomazone mode of action. Pesticide Biochemistry and Physiology 85:7–14.

Ferhatoglu[1] Y, S., Avdiushko[2], and M. Barrett. 2005. The basis for the safening of clomazone by phorate insecticide in cotton and inhibitors of cytochrome P450s. Pesticide Biochemistry and Physiology 81:59-70.

Barrett, M. Issued April 30, 2002. Patent #6,380,465 for "Cytochrome P450 Enzymes and Related Compounds and Methods".

Baerg[1], R.J., M. Barrett, and N.D. Polge[2]. 1996. Insecticide and insecticide metabolite interactions with cytochrome P450 mediated activities in maize. Pesticide Biochemistry and Physiology 55:10-20.

Polge[2], N.D. and M. Barrett. 1995. Characterization of cytochrome P450 mediated chlorimuron-ethyl hydroxylation in maize microsomes. Pesticide Biochemistry and Physiology 53:193-204.

Barrett, M. 1995. Metabolism of herbicides by cytochrome P450 in corn. Drug Metabolism and Drug Interactions 12: 299-315.

Bradshaw[1], L.D., M. Barrett, and C.G. Poneleit. 1994. Inheritance of bentazon susceptibility in a corn (Zea mays) line. Weed Science 42:641-647.

Bradshaw[1], L.D., M. Barrett and C.G. Poneleit. 1992. Physiological basis for differential bentazon susceptibility among corn (Zea mays) inbreds. Weed Science 40:522-527.

I have advised 3 post-doctoral scholars and served or am serving as major advisor to 9 M.S. and 7 Ph.D. students. Two of my students were named the "Outstanding Graduate Student" by the Weed Science Society of America.

Carol Florence Caudle Baskin
Professor

EDUCATION:

Ph.D. Degree in Biology, Vanderbilt University, Nashville, TN, June 1968

B.S. Degree, Florida Southern College, Lakeland, FL, May 1964. Graduated cum laude

APPOINTMENTS:

Professor, University of Kentucky, 1999 – present

Visiting Scientist, Swedish University of Agricultural Sciences (Uppsala), Aug. 1997-Jan. 1998

Adjunct Professor, University of Kentucky, 1991-1999

Adjunct Associate Professor, University of Kentucky, 1984-1991

Research Program:

My primary focus is the ecology, biogeography, and evolution of seed dormancy and germination. I am collaborating with seed scientists in Australia, China, India, Japan, Taiwan, and Hawaii on seed dormancy and germination problems in a number of species. Also, I am revising our book entitled *Seeds: Ecology, biogeography, and evolution of dormancy and germination.* One of the products of this book is a database of information on seed dormancy on about 14,000 species from all over the world, and I am working with people at Duke University to use this information to do an analysis of the evolutionary relationships of the various kinds of dormancy.

HONORS AND AWARDS:

Weed Science Society of America, Honorary Member (will be announced in February, 2012)

Teachers Who Made a difference, 25 April 2009

[Adjunct] Visiting Professor, Xinjiang Agriculture University, Xinjiang Province, Urumqi, China, 2008-2012

Botanical Society of America Centennial Award in honor of exemplary service to the plant sciences. Botanical Society of American centennial meeting, 2 August 2006

University of Kentucky Research Professor, 2003-2004

Merit Award, Botanical Society of America, 8 August 2001

The New York Botanical Garden Henry Allan Gleason Award for an outstanding recent publication in the field of plant taxonomy, plant ecology, or plant geography, 1999 [for *Seeds: Ecology, biogeography, and evolution of dormancy and germination*]

RECOGNITION:

ELECTED POSITIONS

President, Botanical Society of America, 1998-1999

Program Director, Botanical Society of America, 1990-1993 and (re-elected) 1993-1996

Secretary of the Botanical Society of America, 1980-84

Secretary of the Association of Southeastern Biologists, 1979-1982

EDITORIAL POSITIONS

Editorial Board, *Weed Biology and Management*, 2010-

Editorial Board, *Acta Botanica Yunnanica*, 2006 –

Editorial Board, *Seed Science Research*, 2003 –

Associate Editor, *Native Plants Journal*, 1999 – 2004

Book Review Editor, *Journal of Vegetation Science*, 1995-2004

Associate Editor, *Wetlands*, 1996-1999

Plant Autecology Subject Matter co-editor, *Bulletin of the Torrey Botanical Club*, 1987-1997

GRADUATE STUDENT TRAINING (1999 TO PRESENT):

Co-chair of Committees:

6 Ph.D. students – degree completed

1 M.S. student – degree completed

1 Ph.D. student – currently working on degree

Member of other Ph.D. or M.S. committees: 12

Outside member of Committee (appointed by Graduate School): six

Outside reviewer of dissertation of Ph.D. students at other universities: six

Member of Ph.D. Committee at other universities: five

TEACHING (1999 TO PRESENT):

Spring 1999

BIO 425-001 Seminar for undergraduates

BIO 770-005 Seminar for graduate students

BIO 152 (botany half of course) Principles of biology II

Fall 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011

PLS/BIO 210 (half of course) Life processes of plants

Fall 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011

BIO 351 Plant kingdom (whole course)

Spring 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009
BIO 152 (botany half of course) Principles of biology II

Spring 2001, 2005, 2007, 2010
PLS 657 (4 lectures) Seed Biology
Spring 2010
BIO 425-012, BIO 425-013

INVITED PRESENTATIONS:

Workshops on seed dormancy and germination (co-presented by C. and J. Baskin): 14

Talks, seminars, and lectures (invited, off-campus) since 1999: 61

PUBLICATIONS:

BOOK:

Baskin, C.C. and J.M. Baskin. 1998. Seeds: Ecology, biogeography, and evolution of dormancy and germination. Academic Press, San Diego. xiv + 666 pages.

INVITED CHAPTERS IN BOOKS: 13

REFEREED JOURNALS:

Special invited papers: 6

Regular submissions: 423 (+ 7 in press)

Faculty Positions

2008-present Professor of Environmental Chemistry and Toxicology
Department of Plant and Soil Sciences, University of Kentucky, Lexington, KY

2006-2007 Georgia Power Professor of Environmental and Soil Chemistry
Department of Crop and Soil Sciences, University of Georgia, Athens, GA

1999-2007 Director
Savannah River Ecology Laboratory, University of Georgia, Aiken, SC

2001-Present Adjunct Professor
Marine Biomedicine and Environmental Sciences Program, Medical University of South Carolina (MUSC), Charleston, SC

1995-2008 Professor, Environmental Geochemistry
Savannah River Ecology Laboratory, Aiken, SC and Professor, Soil Physical Chemistry and Mineralogy, Department of Crop and Soil Sciences, University of Georgia

1990-present Adjunct Professor
Environmental Systems Engineering, Clemson University, Clemson, SC

1989-1995 Associate Professor
Division of Biogeochemistry, Savannah River Ecology Laboratory, Aiken SC and Department of Crop and Soil Sciences, University of Georgia, Athens, GA

1984-1989 Assistant Research Professor
Savannah River Ecology Laboratory, University of Georgia, Aiken, SC

Position: Soil and Environmental Chemistry, 90% research, 10% teaching

Education

B.S. University of Connecticut, 1978, Plant and Soil Science
M.S. Virginia Tech, 1980, Soil Science
Ph.D. University of Kentucky, 1983, Soil Science

Program Description

Research

My research interests are in the area that has become known as ***molecular environmental science*** and focuses on elucidating the biogeochemical mechanisms controlling the fate, transport, and bioavailability/toxicity of contaminants in the environment and on using this information for the development of novel minimally invasive remediation strategies for contaminated sites. Among the most challenging problems in the chemical

speciation of metals and metalloids is defining and understanding the role of nanoparticulate forms vs. dissolved complexed and uncomplexed forms. Fundamental discoveries on the mechanisms controlling bioavailability, tissue specific accumulation, and toxicity that emerge from this research area, inform not only risk assessment related to nanomaterials in the environment, but also the development of safer biologically benign nanomaterials for agricultural and industrial applications as well as use in bio-nano-technological applications, such as drug delivery.

Teaching

My recent teaching efforts focus on the UK Honors Program track 'World Food Issues-living with limits' where I teach the third course in the three course sequence. I am developing a graduate level class "Surface chemistry of minerals" which I intend to offer Fall of 2012.

Professional Recognition

M.L. Jackson Award for excellence in research and teaching- soil chemistry and mineralogy (SSSA); Brooks Award for Research Excellence (UGA); Excellence in Undergraduate Research Mentoring (UGA); Soil Science Research Award (SSSA); Outstanding Alumni Award (Virginia Tech); Fellow-Soil Science Society of America; Fellow-American Society of Agronomy; Fellow- the International Union of Pure and Applied Chemistry; Fellow-American Association for the Advancement of Science; lifetime National Associate of the NRC, National Academy of Sciences.

National Service

President Elect-President-Past President-Soil Science Society of America(2008-2010); Chair-U.S. National Committee for Soil Science-NAS; Member of the Scientific Advisory Committee of the Advanced Photon Source (APS-Argonne Natl. Lab); Design team member of sector 13 (GeoSoilEnviro-CAT) at the APS; Vice Chair of the Consortium for Advanced Radiation Sources, Univ. Chicago; Member of steering committee for EnviroSync, a national advisory group representing broad the based environmental chemistry and geochemistry communities to NSF and DOE on issues related to EMS research; Participating Research Team Member of beamline X-26A, National Synchrotron Light Source (BNL); EPA task force member for developing guidance for MNA of metals and radionuclides; National Academy of Sciences, Committee for Earth Resources - NAS; Secretary and Chair Council of Scientific Society Presidents; Chair, Alliance of Crop, Soil, and Environmental Science Societies.

Graduate Student Advisor

Advised 6 MS and 13 PhD students

Current Research Support
Mark Wiesner et. al. Duke University; Greg Lowry et al., Carnegie Mellon University; Michael Hochella et. al., Virginia Tech; Gordon Brown, Stanford Univ.; Kim Jones et al., Howard University; Paul Bertsch and Jason Unrine, Univ. of Kentucky. National Center for the Environmental Implications of Nanotechnology (CEINT). National Science Foundation and U.S. EPA. ($14,400,000; Center member and PI on sub-award-pmb portion $550,000) 10/1/2008-10/30/2013;Steven Sutton, Anthony Lanzirotti, Mark Rivers Univ. of Chicago; Paul Bertsch University of Kentucky. Synchrotron X-ray Microprobe and Microspectroscopy Research in Low Temperature Geochemistry. U.S. Department of Energy. ($688,497; co-PI on grant and PI on sub-award from Univ. of Chicago; pmb portion $150,000) 11/1/11-10/31/2014); Paul Bertsch, Nadine Kabengi, David McNear, Olga Tsyusko, and Jason Unrine; Greg Lowry and Elizabeth Casman (Carnegie Mellon Univ); Mark Wiesner (Duke Univ); Steven McGrath et. al. (United Kingdom PI). Transatlantic Initiative for Nanotechnology and the Environment (TĪNĒ). U.S. Environmental Protection Agency STAR ($4 M total, U.S. portion $2 M; U.S. PI and overall Project Lead (PL) 7/15/2010-7/14/2014; Jason Unrine, Olga Tsyusko, Ursula Graham, D. Allan Butterfield, Paul Bertsch Environmental behavior and bioavailability of Ag and CeO2 nanoparticles: the role of surface functionalization and its interaction with natural organic substances and iron oxohydroxides.U.S. Environmental Protection Agency STAR Grant ($599,840; co-PI); Paul Bertsch and Ellen Bergfeld (SSSA). Emerging Frontiers in Rhizosphere Science Workshop. National Science Foundation ($55,400; PI). 10/1/2010-9/30/2011.
Refereed journal articles (7 current year, >180 career; > 5075 citations; H-index-40) Neal A.L., N. Kabengi, A. Grider, and P.M. Bertsch. 2011. Can the Soil Bacterium *Cupriavidus necator* sense ZnO Nanomaterials and Aqueous Zn^{2+} Differentially? *Nanotoxicolo*

Joseph Chappell

Education and Training:
University of California, San Diego: B.A. in Biology, 1973-1977
University of California, Santa Cruz: Ph. D. in Biology, 1977-1981
Universität Freiburg and MPI, Cologne: Postdoctoral studies, 1981-1983
University of California, San Diego: Postdoctoral studies, 1984

Professional Experience:
University of Kentucky: Assistant, Associate, Full Professor - 1985, 1991, 1997
Salk Institute, Plant Biology Lab: Sabbatical leave, 1994-1995
University of Strasbourg, Dept. of Isoprenoids, Sabbatical leave, 2002

Program Description:
The Chappell laboratory has a longstanding interest in terpene metabolism and especially those pathways utilizing farnesyl diphosphate (FPP), a key 15 carbon intermediate for the biosynthesis of a very diverse array of outcomes. Our entry into the world of terpene metabolism was initiated by a much earlier observation. When solanaceous plants, tissues or cells are challenged with microbial pathogens or elicitors, the plant cells cease sterol biosynthesis, and instead synthesize and secrete anti-microbial sesquiterpenes. While our long-range aims are to determine the physiological contributions of sesquiterpenes and triterpenes to overall plant growth and development, to use this information to improve agronomic traits and plant performance, and to engineer plants for the production of known and novel terpene compounds having utility for agriculture, medicine and industry, such goals are more readily accomplished with as complete an understanding of the underlying molecular and biochemical mechanisms as possible. These include the elucidation of specific sesquiterpene biosynthetic pathways, understanding the interplay between sesquiterpene and triterpene metabolism, defining the regulatory mechanisms controlling both pathways, and dissecting the enzymological wizardry of the enzymes making up these biosynthetic pathways. These are the

areas currently under investigation in the Chappell laboratory.

Professional recognition: (select, recent)

- 2010 Elected Fellow to the American Association for the Advancement of Science
- Editorial Board member, Journal of Biological Chemistry, 2006-2011.
- Decision Editor, Plant Physiology, 2009-2014.
- Member and Chair, Advisory Committee to the Arkansas EPSCoR ASSET and Plant-Based Bioproduction initiatives, 2007-present.
- Member, University of North Texas Advisory Committee for the advancement of Plant Sciences as an emerging area of excellence, 2008-present.
- Scientific Advisory Board member, Sapphire Energy, an algal biofuels start-up enterprise. Dec., 2008 - present.
- Scientific Advisory Board member, Center for Advanced Biofuel Systems (a DOE supported consortium), Feb. 2011 - present.

Research Support: (current and recently completed)

1. Unraveling the Catalytic Specificity of Terpene Hydroxylases and Engineering Sesquiterpene Hydroxylation into Plants, NSF-MCB-0721203, 2007-2011, $560,389 total costs, Principal Investigator
2. Metabolic Engineering of Terpene Metabolism in Plants and Yeast. Proctor & Gamble, $293,333 total costs, 2008-2011, Principal Investigator
3. Development of a Sustainable Production Platform for Renewable Petroleum Based Oils in Algae, NSF - CBET-0828817, 2008-2011, $249,925 total costs, Principal Investigator
4. Evolving New Catalytic Specificities within a Terpene Synthase, Sapphire Energy, 2009-2011, $301,308 total costs, Principal Investigator
5. Advancing Drug Development from Medicinal Plants Using Transcriptomics and Metabolomics, NIH, 2009-2011, $6,000,000 total direct costs, Program Director
6. Development of Rhodobacter as a Versatile Microbial Platform for Fuels Production, DOE-ARPA, 2010-2013, $290,000 total costs, Co-Principal Investigator (Wayne Curtis, Penn. State, PI)
7. Functional characterization of terpene biosynthetic genes in desert legumes, Qwell Pharmaceuticals, 2010-2011, $95,000, Principal Investigator
8. Engineering High Value Oil Production Into Biofuel Crops. USDA-NIFA, 2011-2016, $1,000,000 total costs, Principal Investigator

Research Publications: (selected examples from 71)

1. BT Greenhagen, PE O'Maille, JP Noel and J Chappell. 2006. Identifying and manipulating structural determinates linking catalytic specificities in terpene synthases. Proc. Natl. Acad. Sci. 103:9826-9831
2. S Wu, M Schalk, A Clark, RB Miles, RM Coates and J Chappell. 2006. Engineering novel natural product production platforms in plants. Nature Biotech. 24:1441-1447
3. S Takahashi, YS Yeo, YX Zhao, PE O'Maille, BT Greenhagen, JP Noel, RM Coates and J Chappell. 2007. Functional characterization of premnaspirodiene oxygenase, a cytochrome P450 catalyzing regio- and stereo-specific hydroxylations of diverse sesquiterpene substrates. J. Biol. Chem. 282:31744-31754
4. TD Niehaus, S Okada, TP Devarenne, DS Watt, V Sviripa, J Chappell. 2011. Identification of unique mechanisms for triterpene biosynthesis in *Botryococcus braunii.* Proc. Natl. Acad. Sci. 108:12260-12265

Synergistic Activities:

1. Agricultural Biotechnology Degree Program –I helped initiate this degree program in 1988 which emphasizes genetics, biochemistry and molecular biology. The program graduates 40 to 45 students/year with ~75% of the students going on to graduate or professional programs. I am currently an academic advisor for the program and routinely direct several undergraduate research projects (a requirement of this program) per year. For example, Madison Wallace and Pat Dahlstrom are current ABT 395 students working in my lab.
2. Experimental Techniques in Biotechnology - ABT 495, This is a laboratory techniques course developed from the research in the Chappell laboratory to give undergraduate students the technical skills and conceptual understanding necessary to critically examine biological systems at the chemical, biochemical and molecular genetic level.
3. DNA Science – An outreach effort for Middle to High Schools programs, Community College science instructors, and Extension Specialists, since 1992. Our DNA Science operates as a resource center during the academic year, offering materials, supplies and experimental protocols for 2-3 area schools per semester, contact with 100-300 HS students per semester.

Thesis advising and Postgraduate-Scholar Sponsor: (last 4 years)

I'm currently serving as the Major Advisor for 6 Ph.D. students and 3 Postdoctoral Scholars. Two Ph.D. students from my program successfully completed their degrees during this period and 3 Postdoctoral associates have moved to other positions. One went with a private company, one moved to another postdoctoral

position at UK and the third is in a special teaching tract at the University of Nebraska-Omaha.

MARK S. COYNE

PROFESSOR OF SOIL MICROBIOLOGY

Education

Ph.D. 1989 Michigan State University – Crop and Soil Science (Soil Microbiology)
M.S. 1984 University of California, Riverside - Soil and Environmental Science
B.S. 1982 Iowa State University - Agronomy and International Agriculture

Professional Experience

2006-present Professor, University of Kentucky
1997-2005: Associate Professor, University of Kentucky
1991-96: Assistant Professor, University of Kentucky
1989-90: Postdoctoral research scholar, Department of Soil Science,
University of California, Berkeley

Distribution of Effort

FY 2009/1053% Research, 37% Instruction, 10% Administration
FY 2010/1168% Research, 22% Instruction, 10% Administration
FY 2011/1253% Research, 37% Instruction, 10% Administration

Research Description

My goal has been to develop a program in applied and environmental microbiology and biochemistry that addresses nitrogen transformations in soil, soil and water quality, and environmentally sound waste management. It is designed to be

collaborative, and to address research at basic and applied levels. The current focus of the program is nitrogen and carbon transformations in soil, particularly urea transformations, and microbial transformation of waste gases in compost systems. A major emphasis has been to look at the interaction of plants, insects, and microbial activity on the structure and function of soil ecosystems in pasture and riparian environments.

Teaching and Advising Description
I am heavily invested in graduate education, teaching six courses at that level on topics relative to waste management in soil, soil microbiology, and graduate professional development. In addition to the 4 PhD students I currently advise, I also advise 20 undergraduates in the Natural Resource and Environmental Science and Horticulture, Plant, and Soil Science Majors.

Service and Administration Description
In cooperation with two other colleagues I helped develop the new IPSS graduate program in our department and currently serve as its acting DGS for administrative purposes. I helped to initiate two courses, IPS 610 and IPS 625 that will serve as core courses in this program. As part of outreach activities associated with African Cemetery No. 2 in Lexington, I am promoting service-learning activities by UK and particularly College of Ag students in that cemetery.

Honors and Awards
Heick Professor of Soil Science 2011-2012

Most Recent Publications
Refereed Journal Articles:
Handayani, I.P., **M.S. Coyne**, and T. Phillips. 2011. Soil organic carbon fractions differ in two contrasting tall fescue systems. *Plant Soil* 338: 43-50.
Proceedings:
Gumbert, A.A. and M.S. Coyne. 2011. Managing riparian buffers to improve soil structural properties. *In* Proc. North Central

Extn-Industry Soil Fertility Conf. Des Moines, IA. 27:138-144.

Book Chapters:

Ritchey, S., S. Gandhapudi, and **M.S. Coyne** 2011. Stability of antibiotic resistance patterns in agricultural pastures: Lessons from Kentucky USA. Antibiotic resistance. ISBN 978-953-307-599-0 Intech Open Access Publisher, Rijeka Croatia. (Accepted)

Manuscripts Submitted:

Maia, G.D., G. B. Day, R.S. Gates, J. L. Taraba, and **M. S. Coyne**. 2011. Moisture effects on greenhouse gas generation in nitrifying gas-phase compost biofilters. Water Research. Submitted 10/20/2011.

Current Funded Research

Moe, L. and **M.S. Coyne (Co-I)** 2011. "Metagenomic Analysis of Microbial Urea Transformation in Soil." USGS 104b Student Research Enhancement Proposal. KY Water Research Institute. $5000.

Coyne, M.S.(PI), D. Potter, and T. Phillips. 2007-2011. "Forage Systems for Sustainable Animal Production in the Mid-South. Sub-objective 2c Abiotic/biotic components and mechanisms of the plant-animal-environment interface impacting pasture production and environmental quality." USDA 6440-05-00-Forage-Animal Production Research Unit (**FAPRU**). $123,000.

Matocha, C. (PI), **M.S. Coyne (Co-I)** and A.-F. Miller (Co-I). 2007-2012." Inhibition of Fe(III) Reduction by Nitrate: Impact of Anoxic Chemical and Fe(II) Oxidation." CSRES Award # 2007-35107-18311, $286,000.

Graduate Student Advising

M.S. Students: Mary E. Taylor, 2000 – present

Ph.D. Students: A. Gumbert, 2008-present; S. Kreba, 2009-present (Co-Advisor); C. W. Ingram 2010-present; S. Liu 2011-present

Committee Service: M.S. Students (2) – C. Burton, W. Ford; Ph.D. Students (4) – M. Poulette, W. Hare, P. Dhakal, C. Zou

Post Doctoral Scientists: Essam El-Naggar, August 2008 – March 2011

Visiting Scientists Hosted: Yongshan Li, February 2011 – January 2012

Outside Examiner: Sarah Hall July 2011; Bless Adotey September 2011

Outreach Presentations

07/21/2011. Princeton Field Day. “Roadblocks in the Path of the Nitrogen Cycle: Inhibiting Nitrogen Change”
02/28/2011-03/01/2011Science Readiness Mini-bridge Program Dunbar High School
01/25/2011 – Southern States Growmaster Program, Lexington KY. “Nutrient and Bacterial Impacts on Water Quality.”

Leadership/Service University Faculty Senate 2009 – present

Faculty Senate Council 2011-2012

Name: **Dr. Elisa Marie D’Angelo**
Faculty position: Associate Professor of Soil and Water Biogeochemistry
Education
Ph.D., 1998 Institution: University of Florida, Gainesville, FL
Area: Wetland Biogeochemistry, minor Environmental Engineering Science
Dissertation: "Soil Processes Regulating the Fate of Chlorophenols in Wetlands".
B.S., 1985 Institution: University of Central Florida, Orlando, FL
Area: Limnology and Biology, minor Chemistry

Program description
Research: Nationwide, millions of pounds of antibiotics are fed to livestock (e.g. poultry) at subtherapeutic levels in order to promote growth and prevent the outbreak of bacterial and protozoan diseases. Most of the antibiotics are excreted in manure, and most of the manure is applied to land to improve soil fertility. With this practice, however, are several concerns that widespread application of antibiotics to the environment will affect human and animal health and environmental quality. Through a combination of field and laboratory experiments, our research has recently shown that native bacteria in soils have high degrees of resistance to many antibiotics used in the poultry industry, that nitrogen transformations conducted by native soil microbial populations are not significantly affected by antibiotics at

environmentally-relevant concentrations, and the likelihood of horizontal gene transfer of virginiamycin resistance genes between soil and manure bacteria is low, likely due to several HGT barriers. Furthermore, we have found that the organoarsenical roxarsone applied to soils is tightly sequestered to Fe and Al oxyhydroxides in soils, which inhibits arsenic uptake by plants and translocation through the soil profile to groundwater.

Another area of research that my students and I have been involved recently is characterization of the organic carbon sequestration processes in agricultural and forest soils. This topic is of interest because (i) soils have a very high ability to sequester organic C, and thus mitigate CO_2 pollution and climate change, and (ii) changes in soil organic C have a major impact on agricultural production and soil quality. Through a combination of field and laboratory experiments, we have discovered that (i) forest soils have about three times higher ability to sequester organic C as agricultural soils (due primarily to differences in organic C quality and input levels), (ii) organic C is protected from biodegradation in soils primarily due to the presence of highly biochemically-recalcitrant compounds (lignin and humic substances) and chemical interactions of these compounds with amorphous Fe and Al oxyhydroxides, as compared to physical protection in soil aggregates. The importance of organic matter amendments on soil quality, microbial community composition, and plant gene expression is being extended by Ph.D candidate Shawn Lucas in my program, who obtained a research grant from the USDA Sustainable Agriculture Research and Education to pursue this topic.

Refereed Publications and Chapters: (titles available upon request)

- Wetlands and aquatic ecosystem-related (26): Carbon, nitrogen and phosphorus cycling, organochlorine sorption and degradation, and microbial ecology using molecular techniques in wetlands, lakes and rivers.

- Terrestrial ecosystem-related (5): Carbon and phosphorus cycling in forest and agricultural soils.

- Analytical chemistry and method-related (4): Biosensor detection of PCBs, microscale determination of P.

Major research projects/grants

- USDA National Research Initiative (2001); PI
- National Science Foundation Career Award (2002); PI
- National Institute of Environmental Health Sciences (2003); coPI
- Panel member for EPA National Futures Research Program, Washington, DC (2002)
- Panel member for USDA-NRI Soil and Soil Biology Program, Washington, DC (2004)

Teaching

In the last two years, I have regularly taught three courses, including (i) a senior level course called "Environmental Sampling and Analysis", which stresses hands-on collection and analysis of water and soils using state-of-the-art analytical equipment, (ii) a senior/graduate level course called "Biogeochemistry", which focuses on the application of chemistry principles to understanding of pollutant fate in soils and water, and (iii) a freshman course "Plants, Soils, and People", in which students gain an appreciation for how farmers can use scientific principles to solve problems associated with feeding growing populations on earth.

Other major contributions:

- Major advisor to graduate students (3 Ph.D; 5 MS; 3 Post docs)
- Graduate student committees and outside Ph.D examiner (>20)
- Undergraduate academic advising of students in the Natural Resource and Envionmental Science Program (>15)
- Natural Resource and Environmental Science Steering Committee
- UK Undergraduate Council Committee
- Presidential Student Fellowship Committee
- Chair of external NRES Review Committee

H. Maelor Davies

Positions
Senior Scientist, Calgene Inc. 1980-95
Director, KY Tobacco Research & Development Center (UK), 1996-2010
Professor, Dept. Plant Soil Sciences, Univ. of Kentucky, 1996-present

Education
B.S. University of Oxford (England), 1974, Biochemistry
Ph.D. University of London (England), 1977, Plant Biochemistry

Program Description
Research

As Director of the Kentucky Tobacco Research & Development Center (KTRDC) responsible for conversion of the program from health-oriented research to tobacco and plant biotechnology I initiated many new projects focused on the plant-based production of new medical and industrial materials, including the customization of tobacco germplasm and production for these new applications. Additional contributions included a new format for research collaboration with industry, resulting in several commercial partnerships.

Since beginning a new focus on my faculty appointment in 2011 I am in process of exploring prospective new research topics in applied plant biotechnology, including a new strategy for

managing herbicide tolerance for weed species which are being 'domesticated' as new industrial crops, and the adaptation of plants to new roles in the sustainable production of useful materials.

Teaching

I am currently in process of designing and creating an entirely new course on practical agricultural biotechnology, whose topics include commercialization, public acceptance, regulation, applications in the developing countries, intellectual property etc. I also lecture on some of these topics in other courses taught by colleagues.

Service

Editorial Board member responsible for soliciting and managing the review articles published by Plant Biotechnology Journal.

Professional Recognition

Life Sciences Visionary Award from the Kentucky Life Sciences Organization, 2004.

Twice commissioned a Kentucky Colonel for professional services (Gov. Patton 1999, Gov. Beshear 2011).

Honorary Kentucky Commissioner of Agriculture, 2011.

Recognized by the Senate of the Commonwealth of Kentucky, for services to life sciences in Kentucky, 2011.

Appointed to Governor's Life Sciences Advisory Board, 2004.

Most recent (personal) research support

H. M. Davies, O. Chambers, B. Fortnum (Clemson Univ.); "A survey of 'GM' technologies appropriate to tobacco production for its traditional markets". Tobacco Research and Education Council; 2009-2011.

H. M. Davies and O. Chambers; "Nicotiana germplasm survey". Tobacco industry; 2008-2010.

H. Hanley, H. M. Davies, L. Henry; "Science literacy project for middle-school teachers". Kentucky Council on Post-Secondary Education; 2009-10

O. Chambers, H. M. Davies; "Industrial product field-test". Industry (Metabolix Inc.); 2009.

H. M. Davies, O. Chambers, C. N, Stewart (Univ. of Tennessee); "Field evaluation of a transgene containment strategy for plant-made pharmaceutical applications in tobacco". USDA Biotechnology Risk Assessment Grants (BRAG) program (national competition); 2007-09, extended into 2011.

Refereed journal articles, trade publications & patents

Author or co-author on 50 research publications and co-inventor on 13 issued patents.

David C. Ditsch
Professor of Agronomy
Director, Robinson Center for Appalachian Resource Sustainability
University of Kentucky
Department of Plant and Soil Sciences

Distribution of Effort

Administration 80%
Extension 20%

Education

1991	Virginia Tech (VPI & SU)	Ph.D. Agronomy	M.M. Alley
1984	University of Kentucky	M.S. Agronomy	J.H. Grove
1980	University of Kentucky	B.S. Agronomy	W.W. Frye

Professional Experience

2009 – Present Director, Robinson Center for Appalachian Resource Sustainability
2009 – Present Professor, Univ. of Kentucky Dept. of Plant and Soil Sciences.
2002 – 2009 Superintendent Univ. of Kentucky Robinson Station
2000 – 2002 "Acting" Superintendent Univ. of Kentucky Robinson Station
1997 – 2009 Associate Professor, University of KY, Dept of Agronomy, Robinson Experiment Station, Quicksand, KY.
1992 - 1997 Assistant Professor, University of KY, Dept. of Agronomy, Robinson Experiment Station, Quicksand, KY.
1991 – 1992 Post-Doctoral Research Associate, VPI&SU. Supervisor: Dr. Mark Alley.
1988 – 1991 Ph.D Degree Candidate, VPI&SU, Agronomy Department. Research Assistant.
1984 – 1988 Extension Agronomy Specialist, University of KY, Cooperative Extension Service, West KY Research and Ed. Center, Princeton, KY.
1982 – 1984 M.S. Degree Candidate, Research Assistant University of Kentucky, Agronomy Dept.
1980 – 1982 Soil Conservationist U.S. Soil Conservation Service, Muhlenberg County, KY.
1979 – 1980 Student Trainee, U.S. Soil Conservation Service, Henderson County, KY.

Applied Research and Extension Focus:

The primary educational and applied research focus of my extension program (DOE 20%) at the Robinson Center is livestock forage systems that extend the grazing season on lands traditionally considered as "marginal" for agricultural enterprises such as steep lands, recently harvested woodlands, and mined lands in the Appalachian Region. Due to limited land resources at the Robinson Center, most of my applied research has been conducted on producer farms located throughout the Appalachian region.

Administrative Responsibilities:

The duties of the Director now include i) supervision of 8 staff, ii) management of facilities at Quicksand (formally the Robinson Station), iii) management of the Wood Utilization Center, iv) infrastructure management at the Robinson Forest and the VanBooven Wildlife Management Area (Laurel Fork) and contributing to budget development and management.

Research (Recent Extramural Funding):

P. Keyser, G. Bates, E. Doxon, J. Morgan, N. Schrick, R. Smith, D. Ditsch, J. Waller. 2011. Restoring imperiled grassland wildlife through grazing innovation in the eastern United States. Funding Source: USDA-NRSC Conservation Innovation Grant. $467,091.00

D. Ditsch. 2006-2008. Improving goat production in Kentucky with forages. Funding Source: Phase I Tobacco Settlement Fund. $154,748.

Recent Publications

Smith, R., G.Lacefield, R.Burris, D. Ditsch, R. Coleman, J. Lehunkuhler, and J. Henning. 2011. Rotational Grazing. Cooperative Extension publication ID-143.

Ditsch, D.C. and P. Scharko. 2011. Co-grazing beef cattle and goats in Kentucky. Cooperative Extension Publication, Plant and Soil Sciences Research Chronicles. Vol. 1, No. 1.

Ditsch, D.C. and Aiken, G.E. 2009. Endophyte infected tall fescue and small ruminant production: Do we have a problem? Forage and Grazinglands doi:10.1094/FG-2009-1104-02-RS

G.J. Schwab, L.W. Murdock, D. Ditsch and M. Rasnake, F. Sikora, and W. Frye. 2007. Agricultural lime recommendations base on lime quality. Cooperative Extension publication AGR-163.

Ditsch, D.C., B.Sears, K. Andries, T. Hutchens and P. Scharko.

2007. Goat production basics in Kentucky. Cooperative Extension publication ID-162.
Ditsch, D.C. and B. Sears. 2007. Chicory: an alternative livestock forage. Cooperative Extension publication AGR-190.
Ditsch, D.C., G. Schwab, J.D. Green, J.T. Johns, R. Coleman, T. Hutchens, and L. Piercy. 2006. Managing steep terrain for livestock forage production. Cooperative Extension publication ID-158.
Ditsch, D.C., C.D. Teutsch, M. Collins, W.D. Whittier, J. Rockett, C.E. Zipper and J.T. Johns. 2005. Managing Livestock Forage for Beef Cattle Production on Reclaimed Surface- Mined Land. ID-157.
Ditsch, D.C., J.T. Johns, S.G. Isaacs, T.B. Mark and C.D. Lee. 2004. Grazing corn: an option for extending the grazing season in Kentucky. ID-152.

Dennis B. Egli

Faculty Positions

Assistant Professor, Dep. of Agronomy, Univ. of Ky., July 1969 to June 1974
Associate Professor, Dep. of Agronomy, Univ. of Ky., July 1974 to June 1979 Professor, Dep. of Plant and Soil Sciences, Univ. of Ky., July 1979 to Present
Position: Crop Physiologist, 80% research, 10% teaching, 10% director of graduate studies

Education

B.S. Pennsylvania State University, 1965, Agronomy
M.S. University of Illinois, 1967, Agronomy
Ph.D. University of Illinois, 1969, Crop Physiology
CIC Traveling Scholar in Climatology, Purdue Univ., 1967-1968

Program Description

Research

The overall objective of my work in Crop Physiology is to understand the physiological processes involved in the production of yield by grain crops with emphasis on soybean. Knowledge of the basic principles of yield production will enhance our ability to increase yield by manipulating the plant or the plant's environment. My current research is focused on the physiological processes regulating seed and pod number in soybean. The number of pods and seeds produced by a soybean community is the primary determinate of yield, but our understanding of the processes regulating pod and seed number is woefully incomplete. In the past we focused on the effects of assimilate availability and the timing of flower and pod development. Currently we are investigating the relationship between the number of nodes on the main stem and pod and seed number - what is more important – the number of nodes and flowers or the supply of assimilates?

To expand our investigations of pod and seed set, we developed a model (SOYPOD) that simulates the fruit set process at an individual node. The model is based on the three factors now known to affect pod and seed number – photosynthesis, sink characteristics and the timing of flower production. The model adequately mimics measured fruit production and we are currently expanding it to describe an entire plant.

In Seed Science and Technology I am continuing our evaluation of the relationship between seed vigor and field performance, specifically the relationship between seed vigor and the uniformity of seedling emergence in soybean and corn.

Teaching

PLS 412 Grain Crops (Team taught)
PLS 502 Ecology of Economic Plants
PLS 602 Principles of Yield Physiology
Grad students directed: MS 9, Ph.D. 7.

Honors and awards

A. Thomas Poe Cooper Research Award, College of Agriculture, 1981.
B. University of Kentucky Research Foundation Research Award, 1981.
C. ICI Americas-American Soybean Assoc. Researcher's Recognition Tour, 1981.
D. Elected Fellow, American Society of Agronomy, 1983.
E. Appointed Associate Editor, Agronomy Journal, three-year term, January 1983
F. Elected Fellow, Crop Science Society of America, 1985.
G. Appointed Associate Editor, Crop Science, three-year term, January 1992.
H. Appointed Technical Editor, Crop Science, for six-year term, January 1995
I. Elected Fellow, American Association for the Advancement of Science, 1995.
J. Seed Science Research Award, Crop Science Society of America, 1996.
K. Book Review Editor, Crop Science, 2004-2006.
L. Crop Science Research Award, Crop Science Society of America, 2006

Recent Publications (Total referred journal publications – 158)

1. Egli, D.B. 1998. Seed Biology and the Yield of Grain Crops. CAB INTERNATIONAL, Wallingford, UK.
2. Egli, D.B. and W.P. Bruening. 2007. Nitrogen accumulation and redistribution in soybean genotypes with variation in seed protein concentration. Plant Soil 301: 165-172.
3. Sadras, V. and D.B. Egli. 2008. Seed size variation in grain crops: Allometric relationships between rate and duration of seed growth. Crop Sci. 48: 408-416.
4. Egli, D.B. 2008. Soybean yield trends from 1972 to 2003 in mid-western USA. Field Crops Res. 106: 53-59.
5. Egli, D.B. 2008. Comparison of corn and soybean yields in the USA – Historical trends and future prospects. Agron. J.!00:S-79-S-78.
6. Lee, C., D.B. Egli, and D.M. TeKrony. 2008. Soybean response to plant population at early and late planting dates in the mid-south. Agron. J. 100: 971-976.
7. Egli, D.B. and P.L. Cornelius. 2009. A regional analysis of the response of soybean yield to planting dates. Agron. J. 101: 330-335.
8. Egli, D.B. 2010. SOYPOD: A model of fruit set in soybean. Agron. J. 102: 39-47.
9. Egli, D.B. 2010. Soybean reproductive sink size and short-term reductions in photosynthesis during flowering and pod set. Crop Sci. 50: 1971-1977.
10. Egli, D.B., B. Hamman, and M. Rucker, 2010. Seed vigor and uniformity of seedling emergence in soybean. Seed Tech. 32:87-95.
11. Egli, D.B. 2011. Time and the productivity of agronomic crops and cropping systems. Agron. J. 103: 743-750.

Jonathan D. Green

Faculty Positions

Assistant Extension Professor, Dept of Agronomy, University of Kentucky, 1986
Associate Extension Professor, Dept of Agronomy, University of Kentucky, 1992
Visiting Scientist, Dept of Crop Science, North Carolina State University, 1994
Extension Professor, Dept of Plant & Soil Sciences, University of Kentucky, 1999
Position: Extension Weed Scientist, 90% Extension, 10% Admistration (Dept Ext Coordinator)

Education

B.S. University of Kentucky, 1981, Agronomy
M.S. University of Kentucky, 1983, Crop Science (Weed Science)
Ph.D. Oklahoma State University, 1986, Crop Science (Weed Science)

Program Description

The goals of my extension program are 1) to develop weed control recommendations and disseminate this information using a variety of educational approaches, 2) to investigate specific weed management problems in forage and grain crops utilizing on-farm research trials with county extension staff and farm cooperators, and 3) to develop traditional and innovative training programs for extension personnel, agrichemical dealers, crop consultants, and farm managers.

An increased emphasis on forage and livestock production systems has resulted in an increased interest and demand for weed control information on pastures, hay fields, and other forage crops. To meet these needs I have been involved in various state, area, and county level classroom sessions and field days including targeted programs such as the Kentucky Master Grazer program. Field studies have been conducted in cooperation with county Extension agents and producers to evaluate integrated weed management strategies to increase pasture productivity. These on-farm sites were also used to host field days for livestock producers and to conduct in-service training for extension personnel. To help support these efforts, I received a USDA-CSREES Southern Region IPM research/extension grant. Research findings were presented at national and regional meetings such as the Weed Science Society of America and Society

of Range Management, National Association of County Agriculture Agents, and the Heart of America Gazing Conference.
Weed control decisions that implement best management practices in grain crops involve a complex set of agronomic, environmental, and economic factors. To reflect changes in weed control technologies that are available for field crops and new weed control research data, each year I co-author the revision of UK Extension bulletin "Chemical Control of Weeds in Kentucky Farm Crops" (AGR-6). This is a key Extension publication in high demand that is used by county Extension staff, crop producers, consultants, agrichemical dealers, and pesticide applicators. I have been involved in targeted programs such as the Kentucky Grain Crops Academy. In addition, I have discussed current weed management issues at the annual Kentuckiana Crop Production Workshop and for the Southern States Grow Master Program, as well as, various other state, area, and county programs and field days.
I also oversee the UK Weed Science Herbarium which functions to assist county Extension offices with proper identification of weedy plants found in grain crops, pastures and other forage crops, home landscapes, and other locations. Over 300 plant specimens are mailed to the Weed Science Herbarium each year plus an additional ~150 requests are received through E-mail or the UK Digital Consulting System (DCS).

Professional Recognition

Fellow Award. Presented by North Central Weed Science Society (December 2009)

M. D. Whitekar Award for Excellence in Extension. Presented by Kentucky Association of Extension Professionals (April 2008)

Distinguished Achievement Award for Service. Presented by North Central Weed Science Society of America (December 1999)

Refereed Journal Articles (1 current publication plus 7 additional for career)

Tolson, J. A., **J. D. Green**, W. W. Witt, G. J. Schwab, and J. A. Omielan. 2012. Integrated Management Strategies Reduced Tall Ironweed Populations and Weed Biomass and Improved Tall Fescue Pasture Productivity. Weed Science 60: [in press]

Extension Publications

16 new extension bulletins plus 15 revised publications authored or co-authored

1 computerized herbicide selection program developed

5 video tapes produced

Current Research/Extension Projects

Lee, Chad and J. D. Green. Comparing Corn Systems in Wide and Narrow Rows. Kentucky Corn Promotion Council. Oct 2010 – Nov 2011. ($35,000) co-PI

Green, J.D. W.W. Witt, K. Burdine, and G. Schwab. Integrated Weed Management Strategies to Increase Pasture Productivity. USDA-CSREES Southern Regional Integrated Pest Management Grant. July 2008–June 2011. ($116,188). PI

Fei, Songlin, J.D. Green, R.D. Paratley. Identify Spatio-Temporal Dispersal Corridors and Hotspots of Invasive Species. USDA-CSREES Phase IV-Precision Agriculture Resources Management Special Grant. 2008-2011. ($74,794) co-PI

Corn and Soybean Integrated Pest Management Workgroup. Kentucky IPM Program. 2009-2012. ($56,538). [collaborator] My involvement in this program includes the Grain Crops Academy and the IPM Weed Nursery. The weed nursery has been used for in-service training programs for county agents, crop consultants and pesticide applicators, industry personnel training, classroom teaching, and field day activities.

Graduate Students Advised

Advised 4 MS and 1 PhD students

Committee member 14 MS and 12 PhD students

Courses Taught

PLS 531 Plant Pest Management Field Course, Lead Instructor (Fall 2008-2010)

PLS 490 Special Topics: Plant and Soil Science Capstone Course, Lead Instructor (Spring 2006-2008); Co-Instructor (Spring 1999-2005)

Extension Presentations

~10 invited out-of-state or state-level presentations (annually)

~20 additional county and multi-county meeting or field day presentations (annually)

Leadership/Service

North Central Weed Science Society, Vice-President 2012, Secretary/Treasurer, 2003-2006

North Central Region Integrated Pest Management Program (4 review panels)

Southern Region Pesticide Impact Assessment Program projects (review panel)

Journal reviewer for *Weed Technology*, *Weed Science*, *Agronomy Journal, Hort Technololgy, Soil Science Society of America Journal, Journal of Production Agriculture*

University Academic Area Advisory Committee - Extension Title Series, 2005-2007

College Advisory Committee for Promotion and Tenure, 2

CURRICULUM VITAE

Name: John H. Grove

Position: Professor of Agronomic Soil Science

Education:

Ph.D., Agronomy, University of Georgia, 1980

M.S., Soil Chemistry, Michigan State University, 1977

B.S., Physical Sciences/Chemistry, Michigan State University, 1975

ABSTRACT OF VITAE:

I have worked in the Department of Plant and Soil Sciences (formerly the Agronomy Department) for 31 years, with my applied field research program generally focused on chemical and physical management of soils under row-crop rotations. On an annual-average basis, I make 2 invited scientific presentations, 5 field day/county meeting/small group outreach talks, and I and my students make 7 other presentations before scientific audiences. My annual instructional appointment has been varied; averaging 9% in the first decade, 35% in the second decade, and 17% in the third. Teacher-Course Evaluations have averaged 3.5 (teacher) and 3.5 (course) for my graduate teaching and 3.0 (teacher) and 3.0 (course) for my undergraduate teaching. In research, I annually average the successful completion of 1 graduate student; co-author 2 refereed journal articles or book chapters, 2 conference proceedings, and 2 extension/outreach publications, while administering about $50,000 in grant funds as a principal or co-principal investigator. I was a member of the Council of Soil Science Examiners of the Soil Science

Society of America for 6 years. I have served/am serving on numerous departmental committees and was Director of Graduate Studies for the Soil Science Ph.D. program for 10 years.

Professional Objectives:

My professional objectives encompass my responsibilities in research, teaching and outreach. I seek to: 1) provide an exceptional environment for the training of graduate students in the art and practice of science along the climate-plant-soil-water continuum; 2) determine and test research hypotheses so as to increase knowledge regarding management mechanisms affecting levels of bioavailable nutrients within the biogeochemical cycles of these elements in Kentucky's soils, particularly with regard to the contributions of crop rotation, tillage, fertilizers and animal manures; 3) secure extramural funding in support of research program goals; 4) instruct undergraduate and graduate students in basic and modern principles in soil nutrient management; and 5) convey the results of my academic work to Kentucky's agricultural community.

Research Interests:

My research in chemical and physical edaphology (chemical and physical soil management) is essentially field research, with considerable supporting laboratory work. My general research interest is in the area of improved soil nutrient and physical property management in agroecosystems, striving especially for greater sustainability with minimal adverse environmental impact in terms of water and atmosphere quality. The research has spanned scales from that of chemical reactions of nutrient elements at soil colloid surfaces to spatial analysis of field protocols in precision nutrient management. More specifically, the research program objectives are directed towards an improved understanding of: 1) spatial and temporal dynamics in soil nutrient cycling and crop nutrition; 2) water and atmosphere quality as related to inorganic/organic nutrient source management (rate, timing and placement); and 3) impacts of crop and tillage rotations on soil chemical and physical properties, with particular emphasis on the no-tillage crop establishment/soil management system.

The research has resulted in refereed papers (58) and proceedings (5), book chapters (7), non-refereed proceedings papers (60), invited presentations (58) and numerous (219) other presentations to scientific, student and grower audiences. Many of the research publications cited above are first-authored by graduate students, and 26 (13 Ph.D. and 13 M.S.) have been directed/co-directed to completion. Eleven are presently in faculty positions, both domestic (7) and international (4).

Current Instruction Interests:

I believe that challenge is the sincerest form of respect that an instructor can give to students. I also want course material to be interesting. Students come to the classroom with varied motives, but most desire knowledge has professional values. In the undergraduate and graduate soil fertility courses that I teach, I integrate nutrient management with other management practices to capture greater value. In the Honors Program I teach to a younger and more diverse student audience. My objective is to develop their communication and analytical skills. A course description follows:

HON 211: World Food Issues III – Limiting With Limits. This course acquaints students with the history of food production, with particular emphasis on the limitations, or lack thereof. Students learn to acquire and interpret information in the execution of the scientific method on their hypotheses. Course requires use of mathematical and statistical information. Students will become more competent in written, oral and visual communication skills. Three lecture hours per week.

PLS/NRE 470G: Soil Nutrient Management. Students learn about the soil factors influencing plant growth. Particular emphasis on chemical element status in soils, soil properties affecting the element's plant availability, and materials/techniques applied to soils to create desired growth media as part of an economically and environmentally sound nutrient management plan. Two lecture and three laboratory hours per week.

PLS 712: Advanced Soil Fertility. Advanced graduate course using the latest knowledge and integrating soil, weather, and physiological factors in plant nutrition and dry matter accumulation. Students will become more competent understanding research literature at the interface between soil chemistry, soil fertility, and plant nutrition. The student will be given field experiment research data, conduct statistical analyses, interpret the results to include an examination of the data for relationships among the variates, and then develop a discussion that relates the experiment's implications for the improved management and science of soils in a context that gives the reader an appreciation of the strengths and weaknesses of the work. Main purpose is to provide the graduate student with ideas and skills for the successful pursuit of knowledge in soil-plant relationships as a professional scientist. Three lecture and three project hours per week.

Outreach Interests:

I do not hold a formal extension appointment. Nonetheless, I have a responsibility to assist my extension colleagues in meeting their goal of educating the “current generation” of land owners, managers, operators and consultants. Currently, the two greatest issues in nutrient management are the economic and environmental challenges associated with nutrient use in crop production. There is a need for continuing education, maintaining the value of our knowledge regarding plant analysis, soil testing and applying the right rate of the right source, in the right way and at the right time. My applied research program serves some of the outreach needs of the department, college and university. In the aggregate, my outreach writing has resulted in a significant number of both refereed (30), and non-refereed (26) extension publications. I average 5 to 6 oral presentations to Kentucky and regional grower audiences each year.

James Herbek

Faculty Positions

Assistant Extension Professor, Dept. of Agronomy, Univ. of Kentucky, 1970
Associate Extension Professor, Dept. of Agronomy, Univ. of Kentucky, 1975
Extension Professor, Dept. of Plant and Soil Sciences, Univ. of Kentucky, 1990
Position: Extension Grain Crops Specialist, 100% Extension
(Currently on post-retirement appointment, 75% time)

Education

B.S. --- University of Nebraska, 1965, Agriculture
M.S. --- University of Nebraska, 1967, Agronomy

Ph.D. -- University of Illinois, 1970, Agronomy

Program Description

Extension
My extension programs are directed at providing BMP's (Best Management Practices) for the major grain crops (corn, soybeans and wheat) and some minor crops (canola, barley and grain sorghum) in the state to provide Kentucky farmers the opportunity for optimum yield and profitability. Educational programs are delivered through mass media (newspapers, magazines, radio and TV), educational materials (extension publications, newsletters, research reports, news releases and electronic media), meetings (county, regional and state), workshops and conferences. Some of the more recent, popular educational programs include Early Bird Meetings, Grain Crops Academy and Soybean MVP program. Grain crop yield contests continue to be popular with our farmer clientele, ANR agents, and ag industry.
In-service training for ANR extension agents is an important aspect of the grain crops extension program. These are provided as needed and are popular with the ANR agents. An intensive Soybean Technology Transfer program several years ago was extremely popular with ANR agents and industry personnel. A close, working relationship with the commodity associations (corn, soybeans and small grains) has been valuable for support of educational programs and research projects.
Another important aspect of my extension program has been applied field research which has provided valuable information on management practices. Most recent research has emphasized BMP's for soybean (seeding rates, planting dates and soybean management verification program); wheat (no-tillage mgt. and row spacing); corn (rotation); and canola (interest as an alternative crop).

National Service
* ASA/ICI South American Soybean Fact Finding Mission, 1989.
* SERA-IEG 11 (Oilseed Rape) Group, member 1991-1998, Sec.-Treasurer 1993, vice-president 1994, president 1995.
* Southern Soybean Conference, committee 1991-1997, chairman 1996.
* Southern No-till Conference Committee, 1986.

State Service
* Ky. Soybean Assoc., Board of Directors 1983-2011, member of committee(s) 1984-2011.
* Ky. Farm Bureau, committee(s) member 1977-2006.

* Ky. Coop. Ext. Service “Visioning Think Tank” Committee 1993-1994.
* U. of Ky. College of Ag. Field Day Chairman, 2000.

Honors and Awards

* Ky. Soybean Assoc. Distinguished Service Award (state), 1993.
* ASA/USB Meritorious Service Award for Extension (national), 1995.
* CSREES Partnership for Mission Integration Award (national). Wheat Science Group, 2007.
* S.H. Phillips Distinguished Lecture in No-Till Award (national), 2007.
* Southern Region IPM Award (regional). Wheat Science Group, 2008.
* Ky. Extension Outstanding Program/Project Awards (state) (Total of 5 for career).
* ASA Educational Material Program Awards (national) (Total of 6 for career).

Recent Research Support

* Jim Herbek and L. Murdock. Soybean Seeding Rates. KSPB grant. 2005-2007. $21,700.
* S. McNeill, J. Herbek, L. Murdock, et.al. Canola and Sunflower for Oil/Biofuel Production. GOEP Energy R & D Program grant. 2008. $57,500.
* C. Lee, J. Herbek and J. Martin. Weed Control in Low Soybean Populations. KSPB grant. 2007-2008. $21,000.
* C. Lee, J. Herbek, L. Murdock and G. Schwab. SOY MVP: Kentucky Soybean Management Verification Program. KSPB grant. 2008-2011. $303,400.
* Jim Herbek. Soybean Opitmum Planting Date. 2008-2011. $14,000.
* Chad Lee and Jim Herbek. Wheat Row Spacing Study. 2008-2011. $17,500.

Extension Publications

* Agronomy Notes (11 published for career).
* Corn and Soybean Science News (24 articles for career).
* Soil Science News and Views (4 articles for career).
* Wheat Science News (23 articles for career).
* Numbered Series (Last 3 years, plus 50 additional for career).

a) Lee, Chad, James Herbek, et.al. Wheat Management in Kentucky. ID-125. 2009.

b) Herbek, James, L. Murdock, J. Grove, L. Grabau, D. Van Sanford, J. Martin. Comparing No-Till and Tilled Wheat in Kentucky. ID-177. 2009.

c) Sarver, Jason, C. Lee, J. Herbek, et.al. Soybean MVP Program, 2009. PR-605. 2010.

d) Lee, Chad and James Herbek. Soybean Planting in Kentucky. AGR-130. 2011.

Hildebrand

Arthur G. Hunt

Faculty Positions:

Professor, Department of Plant and Soil Sciences, University of Kentucky, 1996
Associate Professor, Department of Agronomy, University of Kentucky, 1990
Assistant Professor, Department of Agronomy, University of Kentucky, 1985

Education:

Ph.D. Brandeis University, 1982, Biochemistry
B.S. University of Lowell, 1976, Biological Science

Program Description:

Research:
The major focus of this laboratory is the characterization of mechanisms of mRNA 3' end formation in higher plants. These studies deal with various evolutionary, biochemical, and structural aspects of the plant polyadenylation complex. Some of the more recent research in this project deals with mechanisms by which cellular signaling pathways affect the functioning of the polyadenylation complex in plants. In this regard, it has been determined that two distinct but complementary signaling networks, involving calcium- and redox-mediated controls, converge on a novel polyadenylation factor subunit. To further define the consequences of calcium- and redox- mediated control of polyadenylation, high throughput methods for studying poly(A) site choice on a genomic scale have been developed. The combination of directed biochemical studies and genome-wide polyadenylation assays should continue to provide new insight into a fundamental process, namely the control of alternative polyadenylation by cellular signaling.

Teaching:
I teach a course (PLS 620 - Plant Molecular Biology) designed to introduce graduate school students in the College of Agriculture in current concepts in Plant Molecular Biology. Lectures from this course has been used to develop two one-hour, stand-alone “minicourses” – one on the history of the so-have “Small RNA World” (otherwise known as the field of microRNAs and small interfering RNAs) and of its interface with plant biology, and another on high throughput DNA sequencing, especially as applied to studies of gene expression in plants. These lectures have been delivered four times in the past three years to undergraduate classes in two universities.

Professional Recognition
National Service:
Member, NIH study section (ZRG1 IMST-G 11), June 2009.
Member, NIH/NCI study section, SBIR Topic #204 Phase II, August 2008.
NSF Grant Review Panel, Gene Expression (RNA: Transcription, Processing, Structure and Function), November 6-8, 2006.
Member, NIH Study Section (ZRG1 DDD - BCMB 11), July 2005
Member, NIH study section, Gene Expression, February 2003

Member, NIH SBIR/STTR Study Section (ZRG SSS-2), 2001 - 2004 (2-3 meetings per year)
Member, Plant Genetic Mechanisms Panel, USDA NRI Competitive Grants Program, Spring 1996, Spring 1998, Spring 2000
Editorial Board, *Journal of Plant Biochemistry and Biotechnology,* 1995 - 2001
Reviewing Editor, *In Vitro Plant Cellular and Developmental Biology*, 1991 - 1996
Scientific Advisory Committee, ACRI Endowed Cocoa Molecular Biology Program, The Pennsylvania State University, 1986 - 1993

Graduate Student Advising:
Current: 2 Ph.D. students
Completed: 9 Ph.D. recipients, 3 M.S. recipients

Current Research Support:
National Science Foundation IOS-0817818, "CPSF30 at the convergence of mRNA polyadenylation, splicing, cellular signaling and development in plants", Sept. 1, 2008 – Aug 31, 2011; $450,000. Two $3000 REU supplements were awarded in 2009 and 2010.
Kentucky Science and Engineering Foundation KSEF-2061-RDE-013, "Polyadenylation of stored messenger RNA during seed germination", July 1, 2010 – June 30, 2012; $90,000

Refereed Journal Articles (current year, of 77 total)
Wu X, Liu M, Downie B, Liang C, Ji G, Li QQ, Hunt AG. 2011. Genome-wide landscape of polyadenylation in Arabidopsis provides evidence for extensive alternative polyadenylation. Proc Natl Acad Sci U S A. 108:12533-12538.
Addepalli B., Hunt AG. 2011. Diverse Roles of CCCH Zinc Finger Proteins in Stress and Plant Development Responses. In Zinc Fingers: Structure, Properties and Applications. R. Ciofani anL. Makrlik, eds. Nova Science Publishers. In Press.
Hunt AG. 2011. RNA Regulatory Elements and Polyadenylation in Plants. Frontiers in Plant Genetics and Genomics, in press.

Patents and Inventions:
U.S. Patent # 6,018,106 - Use of yeast poly(A) binding proteins and their genes for broad-range protection of plants against bacterial, fungal, and viral pathogens (co-inventors: Qingshun Li, Carol von Lanken, and Jianjun Yang)
U.S. Patent # 6,342,654 - Use of HrmA proteins and their genes for broad-range protection of plants against bacterial,

fungal, and viral pathogens (co-inventors: Qingshun Li, Songhei Shen, and Sheng Yang He)

U.S. Patent # 6,476,293 - Use of bacterial acetate kinases and their genes for protection of plants against different pathogens (co-inventors: Santanu Dasgupta, Qingshun Li, Chrostopher Lawrence, and Glenn B. Collins)

Nadine Kabengi

Faculty Positions

Assistant Research Professor, Plant and Soil Science Department, Univ. of Kentucky, Sep 2009.
Adjunct Professor, Department of Geology, University of Georgia, 2008.

Position: 100 % research.

Education

Ph.D. Major: University of Florida, 2004, Environmental Soil Chemistry.
Minor: University of Florida, 2004, Physical Chemistry.
M.S. American University of Beirut, 1999, Soil Science.

B.S. American University of Beirut, 1997, Agricultural Engineering.

Program Description

As an environmental soil chemist here at UK and in the larger scientific community my program focuses on two lines of research. First, the fate transport and biogeochemical transformations of manufactured nanoparticles in terrestrial environment and second the development and application of flow calorimetric techniques to the in-situ measurements of surface reactions enthalpies under environmental conditions. These activities are related to my interest in surface chemical processes. Surface chemical reactions at interfaces between natural solids and aqueous solutions play a fundamental role in geochemical and environmental contexts and almost all of the problems associated with understanding the processes that control the composition of the environment concern interfaces, above all interfaces of water with naturally occurring solids.

Research Area 1: Manufactured nanoparticles are used in the widest variety of consumer products and can enter the environment from several sources and pathways. It is therefore critical that risks to the environment be understood and properly managed. The knowledge generated by my research activities is important to ascertain whether manufactured nanoparticles will retain some of their laboratory measured toxicity after their residency time in soil media and on soil surfaces.

Research Area 2: The lack of basic thermodynamic data and studies on environmentally relevant surface chemical processes is a paradigm I intend to change. I build a unique in-house flow calorimeter for directly measuring the enthalpies of surface reactions, and develop methodologies to obtain calorimetric measurements on various species and surfaces under experimental conditions relevant to environmental processes. My laboratory is only one of two across the nation to have this capability and has positioned my program to benefit from many research collaborations.

This line of research continues to be uniquely recognizable, productive, well received in the scientific community and allows me to engage students in my research. As a research professor, I do not have teaching responsibilities, but I regularly teach invited lectures in a number of different classes here at PSS but also in the Geology department for my personal fulfillment.

Awards and Recognition

• Soil Chemistry (S-02) Division Chair, Soil Science Society of America, 2012.
• Early Career members Committee, Soil Science Society of America. 2010-2013
• Honorable mention for undergraduate student's poster presentation (Matthew Woodson).
Tracy Farmer Institute for sustainability and the environment annual showcase.
University of Kentucky, Lexington KY. 2010.

Research Support

• PI-Paul Berstch, Nadine Kabengi, David McNear, Olga Tsyusko, Jason Unrine. 2010-2014. U.S. EPA-NCER. Transatlantic Initiative on Nanotechnology and the Environment; Total $2,000,000. (Kabengi: $175,000, 6.6 months/year for 4 years.)
Role: I am lead co-PI on the transport experiments and potential runoff from soil. I also participate in aging and biogeochemical transformations experiments aimed at addressing the behavior of manufactured nanoparticles in terrestrial environments.

Pending:
• PI-Maria Chrysochoou (U.Conn), PI-Nadine Kabengi (UK), PI-James Kubicki (Penn State), PI-Mike Machesky (Illinois State Water Survey). 2012-2015. Molecular to macro-scale models of adsorption: Integrating spectroscopy, computational chemistry and calorimetry to understand chromium adsorption onto hematite, goethite and ferrihydrite; NSF-CHE. Total $850,910. U. of Kentucky ($ 250,002; Kabengi 4.5 months/year + graduate students)
Role: Using the calorimeter built in my laboratory, I will collect data on chromate sorption and its effect of surface charge. The heat data collected will be used to validate spectroscopy and constraint CD-MUSIC model in determining reactive OH sites.

Refereed Publications (last two years)

• A.Neal*, N.J.Kabengi*, A.Grider, P.M.Bertsch. 2011. Can the Soil Bacterium Cupriavidus necator sense ZnO Nanomaterials and Aqueous Zn^{2+} Differentially? Nanotoxicology 0: 1-10

• *N.J.Kabengi* and A.Thompson. 2011. The Emerging Emphasis of the Nanometer Scale in Soils Environments. Soil Science Society of America Journal. Vol 75 No2. p333-334.

• H.Ma*, N.J.Kabengi*, P.M.Bertsch, J.Unrine, T. C.Glenn, P. L. Williams. 2011. Comparative phototoxicity of nanoparticulate ZnO and bulk ZnO to a free living nematode Caenorhabditis elegans: the importance of illumination mode and primary particle size. Environmental Pollution.

• S.Goldberg and *N.J.Kabengi*. 2010. Bromide adsorption by reference minerals and soils. Vadose Zone Journal. 2010, Vol.9 -780-786.

In review

• R.Henderson, N.Mantripragada, *N.J.Kabengi*, M.Cabrera, S.Hassan, A.Thompson. 2011. Anoxia-induced release of colloid and nanoparticle-bound phosphorus in poultry-litter amended grassland. Soil Science Society of America Journal.

• J.Singer, H.S.Chang, *N.J.Kabengi*, J. C.Seaman. 2011. Modeling Non-Conservative Bromide Migration in Highly Weathered Soils. Vadose Zone Journal.

A.D. Karathanasis

Faculty Positions

Assistant Professor, Dep. of Agronomy, Univ. of Kentucky, 1983
Associate Professor, Dep. of Agronomy, Univ. of Kentucky, 1988
Professor, Dep. Plant Soil Sciences, Univ. of Kentucky, 1994
Position: Soil Genesis and Classification

Education

B.S. (1969), University of Thessaloniki, Greece, Agronomy Department.
M.S. (1978), University of Nebraska-Lincoln, Agronomy Department.
Ph.D. (1982), Auburn University, Department of Agronomy and Soils.

Program Description

A. Research (~70%)
My research program focuses on the areas of pedology, environmental soil mineralogy and geochemistry. A significant part of this program (25%) involves a service component, which is dictated from my responsibilities towards the state and national cooperative soil survey program.
My **Pedology** research is focused on quantitative evaluations of soil, vegetation, and hydrology parameters controlling important evolution processes, functional values, and management practices of natural and disturbed soils. Current goals emphasize: (1) the development of long-term relationships between soil, vegetation and hydrology criteria for a better understanding of genetic processes and behavior of hydromorphic and surface mined soils, and (2) the establishment of a better suitability rating system for on site evaluation of soils used to treat domestic waste water effluents through regional performance evaluations of conventional and alternative systems.
My **Environmental Soil Mineralogy and Geochemistry** research emphasizes quantitative characterizations of soil mineral components important in controlling the behavior and management of natural and disturbed soil ecosystems, with special emphasis on issues related to contamination and remediation of soil and water systems. Currently this research is focused on quantitative assessments of the role of environmental mineral and organic nano- and macro-colloids as contaminant carriers in surface- and ground-waters of environmentally impacted watersheds, including reclaimed coal-mined sites. Findings of these studies are particularly important for assessing critical vectors of surface and ground water contamination in sensitive soil ecosystems (karst, coal-mined areas), and developing effective prevention and remediation strategies.
My Cooperative Soil Survey research component is focused on providing timely field and laboratory technical support needed for proper soil correlation and classification of Kentucky soils and conducting special investigations in areas of the state requiring in-depth evaluation of soil resources for proper land resource policy recommendations and decisions. Our cooperative efforts with NRCS in the soil survey program maintain excellent quality control standards on soil survey activities in the state and the region in updating and improving existing taxonomic and soil use interpretation criteria. The generated soil characterization data are published in soil survey reports and incorporated in a nationally accessible electronic database

where they constitute an invaluable resource for making proper soil use and management decisions.

B. Teaching (~ 30%)
My main teaching responsibilities include the instruction of the courses: (1) Soil Judging (PLS 396-every fall semester), (2) Advanced Soil Judging (PLS 406-most spring semesters), (3) Wetland Delineation (PLS/NRC 455G-every other fall semester), (4) Soil Morphology 7 Classification (PLS 573-every other fall semester), and (5) Clay Mineralogy (PLS 741-every other spring semester), the responsibilities of which I shared (55/45%) with Dr. Matocha. In addition to my regular teaching responsibilities, I conduct 3-4 short courses and workshops each year to train state health department professionals on soil morphology and on-site suitability assessment of soils for septic system installation, operation, and management.

Professional Recognition
National Honor Award from Soil and Water Conservation Society of America (1991).
Elected Chair of Soil Mineralogy Division (S-9) of the SSSA (1994-97).
Fellow Award, SSSA (1999), and ASA (2000).
Fulbright Scholar Award (1999-2000).
Honorary Kentucky Colonel Award from the Kentucky General Assembly (2003).
Heick Soil Science Endowed Professorship (2003-2010).
Editorial Board, International Journal of Soil Science (2006-2010); Journal of Applied & Environmental Research (2009-present); Open Journal of Soil Science (2011-present); Ecology Journal (2011-present).

National Service
Steering committee member for the National Cooperative Soil Survey (1984-1987)
National Soil Taxonomy committee, Soil Science Society of America (1990-1993)
Soil Science Society of America Fellow Selection Committee Member (2001-2003)
Marion L. & Christie Jackson Soil Science Award Committee Member (2002-2003)
Greek National Education System Graduate Program Evaluation Panel (2002-04)
Soil Science Society of America Glossary of Soil Science Committee (2006-2008)
Soil Geomorphology Committee of Soil Science Society of America (2011-present)

Graduate Student Advisor
Advised 21 MS and 9 PhD students

Current Research Support
-Karathanasis, A.D. Soil Morphology Assessments for On-Site Wastewater Treatment Systems. KY Dept. of Health, 2011-12 ($ 30,000).
-Karathanasis, A.D. Soil Laboratory Characterization Support for the Kentucky Cooperative Soil Survey Program, USDA-NRCS, 2011-12 ($ 10,000).
-Karathanasis, A.D. National Soil Characterization Database Development, USDA-NRCS, 2010-12 ($ 21,000).
-Karathanasis, A.D. Distinguishing Indigenous Phosphorous Level Effects on Soil and Water Quality Characteristics of Inner and Outer Bluegrass Soils in Kentucky, USDA-NRCS, 2010-12 ($ 23,500).
-Karathanasis, A.D. Characterization of Kentucky Soils, USDA Special Grants, 2011-12 ($10,000).

Refereed journal articles and book chapters (current year, plus 125 additional for career)
Thompson, Y.L., E.M. D'Angelo, A.D. Karathanasis, and B. Sandefur. 2011. Plant Community composition as a Function of Geochemistry and Hydrology in three Appalachian Wetlands. Ecohydrology (DOI: 10.1002/eco.228).
Karathanasis, A.D. and J.O Miller. 2011. Colloid-Associated Transport of Trace Metals at Reclaimed Mine Sites Following Biosolid Application. P 129-146, *In* M. Selim (ed.) Heavy Metal Dynamics: Reactivity and Transport in the Soil Rootzone, CRC Press, Boca Raton, FL.
J.O. Miller and A.D. Karathanasis. 2011. Biosolid Colloids as Environmental Contaminant Carriers. In Monzer Fanum, Ed., Colloids In the Environment Protection (in press).
Mastin, C.B., J.D. Edwards, C.D. Barton, A.D. Karathanasis, C.A. Agouridis, and R.C. Warner. 2011. Development and Deployment of a Bioreactor for the removal of Sulfate and Manganese from Circumneutral Coal Mine Drainage. *In* Bioreactors: Design, Properties, and Applications. NOVA Science Publishers: Hauppauge, NY (in press).
Miller, J. O., A.D. Karathanasis, and C.J. Matocha. 2011. In-Situ Generated Colloid Transport of Cu and Zn in Reclaimed Mine Soil Profiles Associated with Biosolid Application. J. Applied & Environ. Science (in press).

Dr. Garry D. Lacefield

Faculty Positions

Assistant Professor, Ext. Forage Specialist, Dept. of Agronomy, Univ. of Kentucky, 1974
Associate Professor, Ext. Forage Specialist, Dept. of Agronomy, Univ. of Kentucky, 1978
Professor, Ext. Forage Specialist, Dept. of Plant & Soil Science, Univ. of Kentucky, 1982

Education

B.S. Western Kentucky University, 1970
M.S. Western Kentucky University, 1971, Agriculture Biology
Ph.D. University of Missouri, 1974, Agronomy

Program Description

To provide support, leadership and coordination for forage-based education and training with the Commonwealth of Kentucky.

Honors and Awards

American Society of Agronomy Fellow
Crop Science Society of America Fellow
Extension Award – CSSA
Kentucky Outstanding Extension Specialist
Progressive Farmer Man of the Year
Western Kentucky University Hall of Distinguished Alumni
National Alfalfa Extension Award
Medallion Award – American Forage & Grassland Council
KFGC Alfalfa Public Service Award
KFGC Public Service Award
Honorary Member North America Alfalfa Improvement Conference
Past President American Forage & Grassland Council
CSREES/USDA Regional Award for Excellence in Extension

Publications

Southern Forages Book – Co-author
Monthly Column in Kentucky Cattleman Magazine
Editor of Monthly Newsletter
Published over 300 extension and research related publications

Extension Presentations

Invited speaker at 2 International, 19 National, 11 state and 38 local meetings in past year.
Leadership/Service
Member of many professional societies and organizations.
Technical Director – Oregon Clover Commission, Oregon Tall Fescue Commission, Oregon Orchardgrass Commission, Oregon Ryegrass Commission
Program Chair – American Forage & Grassland Conference, 2012
Coordinator and speaker – National Alfalfa Intensive Training Seminar
Developed Kentucky Alfalfa Conference and served as program chair for 32 years.
Executive Committee – Heart of America Grazing Conference
Program Chairman – Forages at KCA
Program Chairman – Kentucky Grazing Conference

Brad Lee

CURRICULUM VITAE

CHAD D. LEE

POSITION: Extension Grain Crops Specialist (80% Extension, 20% Research)

EDUCATION

- Ph.D., Crop and Soil Sciences, Michigan State University, 2002
- M.S., Agronomy, University of Nebraska-Lincoln, 1998
- B.S., Agriculture, Berea College, 1996

EMPLOYMENT HISTORY

- Associate Extension Professor, State Extension Grain Crops Specialist, University of Kentucky, July, 2008 – present, DOE: 80% Extension, 20% Research
- Assistant Extension Professor, State Extension Grain Crops Specialist, University of Kentucky, July, 2002 – 2008, DOE: 80% Extension, 20% Research
- Extension Associate, Weed Management in Soybean and Potato, Michigan State University, May, 2000 – June, 2002, DOE: 50%

Extension, 50% Research
- Research Assistant, Michigan State University, July, 1998 – April, 2000
- Research Assistant, University of Nebraska-Lincoln, June, 1996 – June, 1998

BRIEF DESCRIPTION, CURRENT EMPLOYMENT

Research 20% - Lead an applied research program in corn, soybean and small grains to support Extension activities. Provide oversight of the Kentucky corn hybrid performance tests.

Extension 80% - Provide statewide leadership for the development and delivery of information for the production and management of Kentucky's grain crops including corn, soybean, and small grains. Interact with county extension agents, producers, commodity groups, agribusiness professionals and organizations.

Graduate Student Advising

- Martin Battaglia, M.S. candidate, 2011 – present. "Corn recovery from defoliation across row widths.
- Chelsea McFarland, M.S. candidate, 2011 – present. "Evaluating corn response to stress across hybrids row widths and plant densities.
- Grant Mackey, M.S. candidate, 2010 – present. "Comparing corn systems in narrow and wide rows", co-advisor with J.D. Green.
- Daniel Jordan, M.S. completed 2010. "Interactions between soybean and management options", advisor.

AWARDS and HONORS

- 2011: Distinguished Service Award, Agronomy Society of America (member of the Transition Team)
- 2008: Distinguished Service Award, Kentucky Soybean Association
- 2006: Outstanding New Extension Specialist Award: (name later changed to "Extension Faculty").

EXTENSION ACTIVITIES (examples)

Early Bird Program (2011): Three meetings targeting early purchase and pre-purchase decisions. Producers, agronomists, and other personnel representing about 600,000 acres were present. Over 90% of the respondents to a survey said they would attend a meeting similar to this next year.
Soybean Management and Verification Program (SoyMVP): An extension specialist (non-faculty) is charged with helping farmers compare university recommendations to their practices. The Kentucky Soybean Board funded this project at about $50,000 per year for the past 4 years.

RESEARCH ACTIVITIES (EXAMPLES)

Pedersen, P. (PI), S. Naeve, K. Thelen, C. Lee, J. Ross and J. Board (co-PI's)	United Soybean Board	$495,044	2011	15%	Agronomic Limitations of Soybean Yield and Quality in the US.
Lee, C.D.	USDA-AFRI	$56,00	2010	100 %	Grain Farming Without Subsidies, Sabbatical to Argentina
Lee, C.D. and J.D. Green	Kentucky Corn Promotion Council	$35,000	2009 - 2010	50%	Comparing Corn Systems in Wide and Narrow Rows
Lee, C.	Hatch	$1,000	2007 - 2012	100 %	KAES project 07-16: Determining Impact of Lower Soybean Plant Populations on Other Practices within the Soybean Production System

James R. Martin

Faculty Positions

Assistant Professor, Dep. of Plant Pathology and Physiology, VPI & SU. 1978
Assistant Extension Professor, Dep. Agronomy, Univ. of Kentucky, 1980
Associate Extension Professor, Dep. of Agronomy, Univ. of Kentucky, 1984
Extension Professor, Dep. of Plant and Soil Sciences, Univ. of Kentucky, 1993

Current Position: Weed Science, 100% Extension

Education

B.S. Agriculture, The Ohio State University, June, 1973.
M.S. Agriculture, The Ohio State University, December, 1975.
Ph.D., Crop Science, University of Kentucky, December, 1978.

Program Description:

Major emphasis is placed on developing and implementing a statewide Extension Weed Science Program for agronomic crops. I play a major role in the following areas:

- Provide input into the development of herbicide recommendations in various forms for growers including the Extension publication "Weed Control Recommendations for Kentucky Grain Crops" (AGR-6). The fact that many of the pesticide dealers display AGR-6 in their place of business is an indication of the visibility of this publication.

- Develop strategies for managing glyphosate-resistant weeds including marestail, Palmer amaranth, and waterhemp in Roundup Ready crops, especially soybeans. Major emphasis has been on

identification and biology of these weeds and proper selection and timing of soil-residual and foliar applied herbicides.

● Develop strategies for managing Italian ryegrass in wheat. It is estimated that Kentucky wheat growers gained a net savings of $25.00/A by following UK recommendations for controlling a modest infestation of just three Italian ryegrass plants/ft^2. Without following our recommendations for managing ryegrass, it is estimated the economic loss to growers, in yield loss alone, would exceed $41.00/A.

● Train Extension agents, pesticide dealers, and others who are involved in making weed control recommendations. A significant part of this effort is associated with continuing education of private and commercial pesticide applicators (PAT) and certified crop advisors (CCA).

● Coordiante approximately 24 field trials annually on weed management in corn, soybeans, and wheat. Results from this research are used in my Extension program. My involvement is field research has increased substantially in the last ten years. The fact the Department of Plant & Soil Sciences provides support in the form of a shared technician has played a key role in the success of my program.

● Serve as a resource person for plant identification and herbicide injury diagnosis. I also serve as pesticide coordinator for section 18 exemptions and 24 c registrations.

Professional Recognition:

● North Central Weed Science Society Distinguished Achievement Award for Service (1998)
● M. D. Whiteker Award for Excellence in Extension (1998)
● Fellow – North Central Weed Science Society (2006)
● Kentucky Association of Ag Agents Outstanding Specialist (2011)

National Service: Examples of committee service since 2005:

<u>Council for Agricultural Science and Technology (CAST)</u>
● Executive Committee representing Plant Protection Sciences Workgroup (2004-2006)
and Exec Committee Liaison (04-05)
● Strategic Plan Committee (Chair 2004-2005)
● Fund-Raising Plan Committee (2004-2005)

● Served as Liaison Crop Biotechnology and Future of Food: A Scientific Assessment. (2005)

● Non dietary Exposure to Organophosphates Symposium Committee (EC Liaison 2005-2006)

Weed Science Society of America

● Membership Committee (2003-2006)

Graduate Student Committees (1983-present): 12 MS and 8 Ph.D.

Funding for Field Research: Support for my field program increased steadily over the last 10 years. In 2001, I received $5,500 from industry for herbicide evaluation trials. This past year I received $48,650 from industry for herbicide evaluation trials and $6,000 from the Kentucky Small Grain Growers Association for research on managing marestail and giant ragweed in wheat.

Manuscripts in refereed scientific journals: (two articles for career)

Extension Publications (numbered series, peer reviewed):
A total of 27 publications were developed during 1980 through 2011. Twelve of these have undergone one or more revisions.

● AGR-6. Martin, J.R. and J.D. Green. "Chemical Control of Weeds in Farm Crops in
Kentucky." Revised annually.

● ID-177. Herbek, J., L. Murdock, J. Grove, L. Grabau, D. VanSanford, J. Martin, J. James, and D. Call. Comparing No-till and Tilled Wheat in Kentucky. August, 2009.

● ID-125. Martin, J.R., and J.D. Green. "Weed Management". Section 6, pp.30-41.
IN: C. Lee and J. Herbek, ed. A Comprehensive Guide to Wheat Management in
Kentucky. October 1997 and revised July, 2009.

Miscellaneous Publications Since 1980: 123 abstracts of talks or posters presented at professional societies; 270 newsletter articles; 103 research reports; 4 Kentucky integrated crop management manuals.

Meetings: Average about four county meetings, seven regional meetings and four dealer /agent
meetings in the state and two out-of state meetings as an invited speaker each year.

Christopher J. Matocha

Position
Associate Professor of Soil Chemistry

Education

- **Ph.D**. (May 2000), Plant and Soil Science, University of Delaware
- **M.S**. (May 1996) Soil Science, Texas A&M University
- **B.S**. (May 1993) Plant and Environmental Soil Science, Texas A&M University

Program Description

This research program has focused on solving frontier mechanistic problems related to the coupling of soil iron(Fe) with the nitrogen (N) and carbon (C) cycles. Addition of nitrate (NO_3^-) to soil inhibits Fe(III) reduction to Fe(II). One proposed explanation for this phenomenon is nitrate-dependent Fe(II) oxidation performed by lithotrophic bacteria and secondary reactions involving chemical Fe(II) reoxidation by nitrate and nitrite. A project funded by the United States Department of Agriculture National Research Initiative (NRI) Competitive Grants Program has revealed that Fe(II) is immediately oxidized as nitrate is added to soil under Fe(III)-

reducing conditions and this process can account for a substantial portion of the nitrate reduced. This process occurred in a moderately well-drained and a well-drained soil subjected to periodic anoxia. This calls into question the previous paradigm of nitrate reduction, which assumes organic carbon is the sole electron donor. Interest in nitrogen stems not only from its importance to plants as an essential nutrient but also from a need to protect water supplies from elevated nitrate levels. Another project has studied the influence of long-term nitrogen fertilizer rate additions on soil mineralogy, phenol oxidase activity, and soil organic matter in an agroecosystem under no-tillage management. These results will be used to inform land managers about sustainable nitrogen fertilizer use, an important need given the challenges of maximizing crop production to satisfy food and energy demands without compromising environmental quality in the twenty-first century.

Honors and Awards

- **Editors' Citation for Excellence in Manuscript Review Award**, Journal of Environmental Quality, January 2002
- **National Research Council Associateship**, Jan. 2000 (declined to accept offer at UK)
- **Theodore Wolf Prize**-Outstanding Ph.D. dissertation in Physical/Life Sciences-May 2000

Publications

- 17 refereed publications, 4 book chapters, 38 abstracts

Research Projects/Grants

- C.J. Matocha **(**PI**),** M.S. Coyne (co-PI), A.F. Miller (co-PI), Inhibition of Fe(III) reduction by nitrate: Impact of anoxic chemical and biological Fe(II) oxidation, USDA-National Research Initiative Competitive Grants Program, 8/01/07-7/31/11, $286,000
- C.J. Matocha **(**PI**),** Interactions of Iron with the Nitrogen Cycle, USDA-National Research Initiative Competitive Grants Program, 8/01/02-7/31/06, $190,000

Graduate Students Advised

- Stephanie Pyzola, M.S., 2010-present, Advisor (Biological and Chemical Pathways in Nitrate-Dependent Iron Oxidation in Agricultural Soil)
- Prakash Dhakal, Ph.D., 2009-present, Advisor (Reactivity of Magnetite and Iron(II)-Bearing Goethite Towards Nitrate and Nitrite)
- Jonathan Edwards, M.S., 2004-2007, Advisor (Birnessite Reduction by Fe(II) and Fe(II)-Organic Complexes)
- Sudipta Rakshit, Ph.D., 2003-2006, Co-Advisor with Dr. A.D. Karathanasis (Abiotic Interactions of Iron(II) Species with Nitrate and Nitrite)
- Katherine Marie Wagner, M.S., 2003-2006, Advisor (Kinetics of Nitrate Reduction by Metallic Iron)

Courses Taught

- PLS 671 Soil Chemistry
- GEN 100 Issues in Agriculture: The Development of Modern Agriculture
- PLS 366 Fundamentals of Soil Science
- GLY/PLS 741 Clay Mineralogy

Leadership/Service

- Chair-elect, S-9 (Soil Mineralogy), 2012
- Associate Editor, SSSAJ, 2011 to present
- Panel member, USDA-NRICGP Soil Processes Program, 2009

Rebecca L. McCulley

Faculty Positions

Assistant Professor, Dept. of Plant & Soil Sciences, Univ. of Kentucky, 2006 - present
Position: Grassland Agroecosystem Ecologist, 85% research, 15% teaching

Education

B.A. Rice University, 1995, Biology
M.S. Texas A&M University, 1998, Rangeland Ecology & Management
Ph.D. Colorado State University, 2002, Ecology

Program Description

Research

My research program seeks to identify the main ecological factors controlling grassland structure and function. Specifically, my lab explores the effects of fungal endophyte symbioses on grassland ecosystem processes, and evaluates how grasslands will respond to global change factors, such as alterations to climate, land use, ultraviolet radiation, and invasive species abundance. This research occurs in grasslands worldwide, but emphasizes native, arid and mesic grasslands, as well non-native, forage dominated systems. My scientific approach is one that blends field research with complementary lab and greenhouse work. My program has active collaborations with ecologists, agronomists, soil scientists both within the United States and world-wide.

Examples of the research areas my lab explores includes: 1) Evaluating how the tall fescue – *Neotyphodium* fungal endophyte symbiosis affects grassland nutrient cycling, carbon storage,

response to climate change, and invasive capabilities; 2) Quantifying the effects of climate change on managed grassland structure and function and soil microbial communities; 3) Identifying how ultraviolet radiation (UV) and soil erosion control litter decomposition and nutrient cycling in arid grasslands experiencing woody plant encroachment; 4) Evaluating top-down vs. bottom-up ecological controls in grasslands of Kentucky and the world.

Teaching

My primary teaching responsibility to date has been PLS 104: Plants, Soils, and People – A Global Perspective. This course educates students about the complexities and concerns facing agriculture in the future, namely that food production needs to keep up with population growth and must be sustainable. I have taught this course every spring since 2008. It is a general education course, and over the past year, I have successfully modified this course to be qualified as a 'Global Dynamics' requirement for the new General Education curriculum. It will be taught as such for the first time in Spring 2012, and as of today (Nov. 22, 2011), both sections of the course are currently full (25 students in each section). I co-developed and taught a new undergraduate course 'Agroecology,' which is now officially listed as a Sustainable Agriculture class, in Spring 2010 & 2011. I contributed to the new course 'Climate Change and Agriculture' in Spring 2010 & 2011 – the status of which I think is uncertain at the moment. I also hope to offer a new, graduate level Grassland Science course in the Spring 2013.

Refereed journal articles (current year only shown, 22 in total for career)

1) Iqbal, J., J.A. Siegrist, J.A. Nelson, R.L. McCulley. *In Press*. Fungal endophyte infection increases carbon sequestration potential of southeastern U.S.A. tall fescue stands. Soil Biology & Biochemistry.

2) Ruffner, M.E., R.L. McCulley, J.A. Nelson, and T.G. Barnes. *In Press*. Ecosystem function differs between Old World Bluestem invaded and native coastal prairie in South Texas. Biological Invasions.
3) McCulley, R.L. and R.B. Jackson. *In Press.* Conversion of tallgrass prairie to woodland: Consequences for carbon and nitrogen cycling. American Midland Naturalist.
4) Hall, S.L., R.L. McCulley, and R.J. Barney. *In Press*. Restoration of native warm season grassland species in a tall fescue pasture using prescribed fire and herbicides. Restoration Ecology.
5) Adler, P.B. and 39 others (including R.L. McCulley). 2011. Productivity does not predict fine-scale plant species richness. Science 333(6050):1750-1753.
6) Firn, J. and 36 others (including R.L. McCulley). 2011. Abundance of introduced species at home predicts abundance away in temperate grasslands. Ecology Letters 14:274-281.
7) Brosi, G.B., R.L. McCulley, L.P. Bush, J.A. Nelson, A.T. Classen, and R.J. Norby. 2011. Effects of multiple climate change factors on the tall fescue – fungal endophyte symbiosis: infection frequency and tissue chemistry. New Phytologist 189:797-805.
8) Gilliam, F.S., R.L. McCulley, and J.A. Nelson. 2011. Spatial variability in soil microbial communities in a nitrogen-saturated hardwood forest watershed. Soil Science Society of America Journal 75:280-286.

Graduate Student Advisor

Advised 5 MS and 1 PhD student to date

Selected Current Research Support (total $1.3 million for my program during UK appointment)

- D.F. Westneat (PI), J. Bouwma-Gearhart (Co-PI), and 10 core UK faculty members (including R.L. McCulley). “Suburban Ecology and Invasive Species.” *National Science Foundation (NSF) REU Site Program*; 2011 – 2014; $300,000
- M. Bradford (PI), N. Fierer, and R.L. McCulley (Co-PI’s). “Collaborative Research: Do expected evolutionary trade-offs in enzyme activities manifest at the level of microbial community function?” *NSF- Ecosystem Science*; 2010-2013; $900,000
- R.L. McCulley (PI). “Effects of warming and altered precipitation regime on managed grassland structure and function.” *U.S. Dept. of Energy - National Institute for Climatic Change Research;* 2008-2012; $375,922

Professional Recognition

'Distinguished Alumnus' Award, Graduate Degree Program in Ecology, Colorado State University, October 2009.

National Service

- Elected and served as President of the Rangeland Ecology section of the Ecological Society of America, July 2009 – 2010.
- Invited to be a member of the International Board of Advisors to the Editors of New Phytologist, October 2009 – 2012.
- Served as a panelist for NSF Ecosystem Science, USDA-AFRI Sustainable Biofuels

David H. McNear Jr.
Assistant Professor, Rhizosphere Science
DOE: 75% Research, 25% Teaching

EDUCATION:
Ph.D., Environmental Soil Chemistry, University of Delaware, Feb 2006
M.S., Environmental Pollution Control, Pennsylvania State University, May 2001
B.S. Environmental Resource Management, Pennsylvania State University, Dec 1997
A.A. Life Science, Harrisburg Area Community College, May 1995

PROGRAM DESCRIPTION:
The Rhizosphere Science lab is focused on interrogating the processes that occur "*where the root meets the soil*", an area otherwise known as the Rhizosphere. The Rhizosphere is the 1-2 mm zone of soil around a plant root which is strongly influenced by the deposits and chemicals released from the plant root the composition of which can be greatly influenced by, and have an influence on, the surrounding environment. Within this broad context, ***research in the Rhizosphere Science Laboratory focuses on the biogeochemical processes occurring within the rhizosphere over multiple spatial scales, and assess the influence of these processes on nutrient cycling, metal tolerance and ecosystem function and health.*** Specifically, we focus on the following three interrelated topics: ***1)*** Plant-microbe interactions and their influence on rhizosphere processes and ecosystem service.

2) Examining plant rhizosphere root-soil-microbe feedbacks to better understand and enhance nutrient use efficiency, stress tolerance and crop productivity. ***3)*** The soil chemical processes controlling metal speciation, mobility and bioavailability and the mechanisms of metal hyperaccumulation and tolerance in plants. To support these efforts I have partnered with researchers at universities, national labs and private industry and **written or participated in the writing of several successful grant proposals totaling over $3.5 million to date from which about $1.2 million has come to my program.**

AWARDS AND HONORS:

- **Presidential Early Career Award for Scientists and Engineers (PECASE).** 2009

-*The PECASE Award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers.*

- Recipient of the UK Ag Student Council **Early Career Teaching Award**. 2009
- Selected as a **Kavali Frontiers Fellow**, National Academy of Science, 2010

GRANT FUNDING: (*$3.5 million total, ~$1.2 million to my program (%)*)

-Federal *(Nationally/Internationally Competitive, ~$3.1 million)*

- Moe, L. (PI), **D.H. McNear** and S. Debolt (Co-PIs). 2011-2015. Plant-Microbe communication in the *Medicago truncatula* rhizosphere: functional metagenomics, biochemistry and community analyisis. **USDA NIFA AFRI, Microbial Communities Program**.....$**452,000** *(10%)*
- **McNear, D.H.**(PI), 2011-2013. *Influence of tall fescue cultivar and endophyte genotype combinations on root system architecture, exudate composition and soil biogeochemical properties.* **USDA NIFA-AFRI Microbial Communities Program**…….....**$265,000** *(100%)*
- **McNear, D. H.** (PI), N. Fierer and R. McCulley. 2008-2012. *Understanding endophyte effects on soil processes in tall fescue pastures: from rhizosphere to regional scales.* **USDA-NRI, Soil Processes Program**…….**$397,500** *(90%)*
- Bertsch, P.M. (Univ. of KY), S. MGrath (Rothamsted Research, UK), A. Neal (Rothamsted Research, UK), J. Unrine (Univ. of

KY), **D. McNear** (Co-PI) Univ. of KY), O. Tsyusko (Univ. or KY), N. Kabengi (Univ. of KY), C. Svendsen (NERC Center for Ecology & Hydrology (CEH), Wallingford, UK), D. Spurgeon (CEH, Wallingford, UK), S. Lofts (CEH, Wallingford, UK), et. al. *2010-2014.* Transatlantic initiative for nanotechnology and the environment (TINE). **Joint U.S. EPA- United Kingdom ENI**....**$2,000,000** *(10%)*

- ***National Lab User Time*** *(internationally competitive, ~$200K)*

- Lawrence Berkeley National Lab, Advanced Light Source (LBNL-ALS) Awarded 70 shifts (23 days) of general user access to beamline 10.3.2 from 2007-2011 ……..….**$118,034 (100%)**
- Argonne National Laboratory, Advanced Photon Source (ANL-APS). Awarded 24 shifts (8 days) of general user access to beamline 13-ID/13/BM from 2008-2010.....**$60,709** *(100%)*
- Brookhaven National Lab, National Synchrotron Light Source (BNL-NSLS). Awarded 24 shifts (8 days) of general user access to beamline X26A. 2007-2009……..**$40,474** *(100%)*

-State/University *($42K)*

- **McNear, D.H.,** (PI) P.M. Bertsch and S. Debolt. (Co-PIs) 2010-2011. Integrated Research, Education and Extension to Enable Sustainable Bioenergy Production – A Proposed Workshop to Organize Research Efforts in the Southeast. U.S. **KY-EPSCoR/CDRG** State Competitive.....**$30,000** *(100%)*
- Grabau L.(PI), **D.H. McNear** and M. Mullen (Co-PIs). 2006. *Technology support for a mastery learning imitative in a growing soil science course.* TASC **Teaching + Technology Innovation Grant**. Internally competitive. ……..…….…….…….…. **$12,500** *(10%)*

-Private contracts

McNear, D.H. (PI) 2009-present. Industrial contract with Advanced Microbial Solutions (AMS) in support of Rhizolab research projects on the influence of biological soil amendments on soil quality, microbial populations and plant growth parameters……..**$106,709** *(100%)*

SELECTED PUBLICATIONS: *(12 pubs, 1 book chapter, 18 published abstracts)*

- **McNear, D.H.** *In Press*. The Rhizosphere – roots, soil and everything in between. *Nature* Education

- Schwer III, D.R.* and **D.H. McNear Jr.** 2011. Chromated copper arsenate treated fence posts in the agronomic landscape: soil properties controlling arsenic speciation and spatial distribution. J. Environ. Qual. 40(4):1172-1181. (**IF=2.33**)
- Afton, S., **D.H. McNear** and J. Caruso and. *Accepted.* Combined capillary reversed phaseLC- ICP-MS and Synchrotron micro x-ray spectroscopy reveals a Hg-Se antagonism in *Allium fistulosum*. Metallomics. (**IF=3.59**)
- Shoults-Wilson, A., O.I. Zurbich, **D.H. McNear**, O.V. Tsyusko, P.M. Bertsch and J. Unrine. 2011. Evidence for avoidance of Ag nanoparticles by earthworms (Eisenia fetida). Ecotoxicology. 20:385-396 (**IF= 3.05**)
- **McNear**, Jr., D.H. and R.L. McCulley. *In Press*. Influence of the *Neotyphodium* – tall fescue symbiosis on belowground processes. Proceedings of the 7th International Symposium on Fungal Endophytes of Grasses, Noble Foundation, Ardmore, OK.

GRADUATE STUDENT ADVISING: *(4 MS, 2 PhD, 6Undergraduate and 2 High School students)*
Rick Lewis (MS in Plant and Soil Sciences, 2009-2011), *Don Schwer* (MS in Plant and Soil Sciences, 2008-2010), *Jingji Guo* (PhD Candidate in Plant Physiology, 2009-present), *Rebecca Sims* (M.S. Candidate in Integrated Plant and Soil Sciences, 2010-present), *Sarah Baltzley* (M.S. Student in Integrated Plant and Soil Sciences, Aug. 2011-present), *Sagarika Banerjee* (PhD. Candidate in Plant and Soil Sciences, 2010-present).
COURSES TAUGHT: *(2007-2011, 255 students total)*
PLS 366 – Fundamentals of Soil Science – Avg TCE: course 3.52, teacher 3.80
GEN 300 – Undergraduate Experience in College Teaching
***** Avg. course rating UK = 3.3/4.0, CAg = 3.4/4.0; Avg. teacher rating UK = 3.4/4.0, CAg= 3.4/4.0

Robert D. Miller

Faculty Positions

Assistant Professor, Dep. of Agronomy, University of Kentucky, 1980
Assistant Professor, Dep. of Plant and Soil Science, University of Tennessee, 1982

Associate Professor, Dep. of Plant and Soil Science, University of Tennessee, 1985
Professor, Dep. of Plant and Soil Science, University of Tennessee, 1993
Professor, Dep. of Plant and Soil Sciences, University of Kentucky, 1999 (60%)
Research Professor, Dep. of Plant Sciences, University of Tennessee, 1999 (40%)
Position: Principal Investigator and tobacco breeder for the KY-TN Tobacco Improvement Initiative, 100% Research

Education

B.A. Berea College, 1974, Chemistry and Biology
Ph.D. University of Kentucky, 1980, Agronomy-Plant Breeding

Program Description

The University of Kentucky and the University of Tennessee merged their tobacco breeding programs in 1999 to form the Kentucky-Tennessee Tobacco Improvement Initiative (KTTII), with program funding and responsibilities of the Principal Investigator apportioned between UK and UT on a 60/40 basis. Because of the unusual dual appointment of the PI and the inordinate amount of travel required to fulfill responsibilities to growers in both States, the tobacco breeding position was created as a Special Title Series appointment. The emphasis of the KTTII breeding program involves cultivar and germplasm development, applied research to help growers select and integrate appropriate crop cultivars into specific farm production practices, and providing unbiased information on performance and quality of crop cultivars to producers and associated industries. The program in both States is funded by industry grants and contracts; since KTTII was initiated in 1999, total external funding is $8,680,082.

The primary objective of the KTTII breeding program is the development of burley and dark tobacco cultivars having improved disease resistance and acceptable chemical characteristics, with special emphasis on reduced nornicotine and tobacco specific nitrosamine (TSNA) content. Since its inception in 1999, KTTII has released five burley and three dark tobacco varieties. These new releases provide burley and dark tobacco producers with varieties that have a better combination of black shank resistance and yield potential than was previously available, and they have been readily accepted by tobacco growers in Kentucky and Tennessee. KT 204LC, KT 206LC, and KT 209LC were the number one selling burley variety the first year they were commercially available to growers; based on seed sales records,

it is estimated that KTTII varieties comprised approximately 70-75% of the US burley crop each of the last four years. These cultivars are also planted widely throughout other burley producing countries. TN 90LC has been chosen as the standard cultivar to be used in all CORESTA sponsored international tobacco research projects.

Professional Honors and Recognition

Philip Morris USA Award for Distinguished Achievement in Tobacco Science
Tennessee Agricultural Experiment Station Research Impact Award
University of Tennessee Epsilon Sigma Phi State Team Award
Murray State University Distinguished Service to Agriculture Award
J.W. Massengill Award for Distinguished Service to Agriculture

Professional Conferences Chaired

General Chairman of the 40th Tobacco Chemists' Research Conference
Chairman of the Burley Section of the 32nd Tobacco Workers' Conference
Program Chairman of the Burley Section of 35th Tobacco Workers' Conference
Chairman of the Burley Section of 35th Tobacco Workers' Conference

Current Research Report ($2,224,232)

R. D. Miller; Tobacco Breeding and Cultural Practices; R.J. Reynolds Tobacco; 2010-2013; $1,000,000; (KTTII); PI
R. D. Miller; Burley Tobacco Breeding and Genetics; Philip Morris International; 2010-2012; $975,000; (KTTII); PI
R.D. Miller and D. Li; Breeding for Reduced Nicotine Content in Burley Tobacco; Burley Tobacco Growers Cooperative. 2009-2011. $75,000 (KTTII); PI
R.D. Miller; Selection of Breeding Lines Having Genetic Markers for Blue Mold Resistance; Philip Morris USA; 2010-2012; $30,000 (UK); PI
R.D. Miller; Development of Parental Breeding Lines Having Resistance to Fusarium Wilt; Philip Morris USA; 2010-2012; $30,000 (UT); PI
K.D. Gwynn, B.H Ownley, and R.D. Miller; Relationship(s) between Altered Nitrogen Metabolism and Low TSNA; Philip Morris International; 2008-2012; $114,232 (UT); Co-PI

Cultivar Releases

Burley Tobacco		Dark Tobacco	
TN 86	1986	DF 485	1985
TN 90	1990	TN D94	1994
TN 97	1997	TN D950	1995
KT 200	2000	KT D4LC	2004
KT 204LC	2004	NL MadoleLC*	2005
TN 90LC*	2004	KY 171LC*	2005
TN 86LC*	2004	TN D950LC*	2005
TN 97LC*	2004	ms TN D950LC*	2005
KT 200LC*	2004	KT D6LC	2006
KY 907LC*	2004	KT D8LC	2008
ms KY 14 X L8LC*	2005		
KY 14LC*	2005		
KY 17LC*	2005		
KT 206LC	2006		
KT 209LC	2009		
KT 210LC	2010		

* Re-released low nicotine to nornicotine conversion versions of the original variety

Luke A. Moe, Ph.D.
Assistant Professor
DOE: 75% research, 25% teaching

EDUCATION

2005 Ph.D., Department of Biochemistry, University of Wisconsin-Madison

Advisor: Professor Brian G. Fox Dissertation: Catalytic Studies and Component Interactions of the Toluene 4-Monooxygenase from *Pseudomonas mendocina* KR1
1999 B.S., Biochemistry, Washington State University, Pullman, WA

RESEARCH POSITIONS

Assistant Professor: Department of Plant & Soil Sciences, University of Kentucky (11/1/2009-present)
USDA NRI Postdoctoral fellow: Advisor: Jo Handelsman, Departments of Bacteriology and Plant Pathology, University of Wisconsin-Madison (2006-2009)
Postdoctoral researcher: Advisor: Rachel N. Austin, Department of Chemistry, Bates College, Lewiston, ME. Research performed in the lab of Brian G. Fox, UW-Madison (2006)
Graduate research assistant: Advisor: Brian G. Fox, Department of Biochemistry, University of Wisconsin-Madison (1999-2005)

PROGRAM DESCRIPTION

My research group is focused on the biology and ecology of microbes relevant to agriculture and biotechnology. We have an interest in plant-microbe and microbe-microbe communication in the rhizosphere, microbial biotransformation of various nitrogen species in soil, and understanding the microbial ecology of bioethanol fermentation. Each of these interests has been funded to some extent since I joined the department just over 2 years ago.

RESEARCH PROJECTS

1. Funded: nationally competitive grants
a. *"Plant-microbe communication in the* Medicago truncatula *rhizosphere: functional metagenomics, biochemistry, and community analysis"* USDA NIFA AFRI foundational program (program area: Microbial Communities in Soil) 6/1/2011-5/31/2015 ($452,000 for 4 years duration); Co-PIs Seth DeBolt (UK Horticulture) and David McNear (UK Plant & Soil Sciences)
2. Funded: regional grants
a. *"Metagenomic analysis of microbial urea transformation in soil"* Kentucky Water Resources Research Institute (Sponsored by US Geological Survey) 3/1/2011- 2/29/2012 ($5,000 for 1 year duration); Co-PI Mark Coyne (UK Plant & Soil Sciences)
b. *"Bacteria and bioethanol fermentation: characterizing the impact of bacterial contaminants and bacterial community structure on bioethanol fermentations across the US"* Kentucky

Science and Engineering Foundation 7/1/2011-6/30/2013 ($90,000 for two years duration); Co-PI Pat Heist (Ferm Solutions, Inc., Danville, KY)
c. *"Harm reduction through enzymatic denitrosation of tobacco-specific ntirosamines"* Kentucky Tobacco Research and Development Center, 2/1/2012-1/31/2013 ($20,000 for 1 year duration); Co-PI Ling Yuan (UK Plant & Soil Sciences)
3. Funded/Approved: other proposals
a. USDA NIFA Hatch proposal: "Functional Metagenomic Analysis of Soil-Dwelling and Plant-Associated Microbial Communities" has been approved (7/1/2011-6/30/2016)
b. *"The role of endophytic bacteria in TSNA accumulation"* Philip Morris International ($25,000 for one year duration) Colin Fisher, Luke Moe, Anne Jack, and Lowell Bush (UK Plant & Soil Sciences)

Graduate Student Advising:
1. Atanas Radkov is a 2nd year Plant Physiology PhD student in my laboratory.
2. Ran An is a 1st year Soil Science PhD student in my laboratory.
3. Marton Szoboszlay is a 1st year Soil Science PhD student in my laboratory.
Postdoctoral Scholars:
I advise one postdoctoral scholar, Jeanne Rasbery. She joined my lab in August 2010.

Teaching

• Fall 2010: ABT 495 "Experimental techniques in biotechnology"; 4 credits; 15 students. I team-taught this course with Professor Joe Chappell (UK Plant & Soil Sciences). I was responsible for 50% of the course. This was my first teaching responsibility since joining the faculty at UK. I took over the course this Fall and will continue to teach this every Fall.
• Fall 2011: ABT 495 "Experimental techniques in biotechnology"; 4 credits; 21 students. I am full responsible for the course (100%) and have not received evaluations at this point.
• Spring 2012: ABT 460 "Introduction to molecular genetics"; 3 credits; ~20 students. I will teach this course during the Spring semester of even-numbered years, starting this Spring.

Publications (since 2009):

1. Donato, J.J., **Moe, L.A.**, Converse, B.J., Smart, K.D., Berklein, F.C., McManus, P.S., and Handelsman, J. (2010) "Metagenomics Reveals Antibiotic Resistance Genes Encoding

Predicted Bifunctional Proteins in Apple Orchard Soil" *Applied and Environmental Microbiology* **76**, 4396-4401.
2. Allen, H.K., **Moe, L.A**., Rodbumrer, J., Gaarder A. and Handelsman, J. (2009) "Functional Metagenomics Reveals Diverse β-Lactamases in a Remote Alaskan Soil" *The InternationalSociety for Microbial Ecology Journal* 3, 243-251.

Peer-Reviewed Book Chapter:

1. **Moe, L.A.**, McMahon, M.D. and Thomas, M.G. "Functional Metagenomics as a Technique for the Discovery of Novel Enzymes and Natural Products." *Enzyme Technologies for Drug Discovery and Development, Volume I: Chemical Biology of Enzymes for Biotech and Pharmaceutical Applications*. Eds. J.R. McCarthy, H.C. Yang and W.K. Yeh. Wiley, 2010

Mueller

CURRICULUM VITAE

2011

Lloyd W. Murdock, Jr.

Degrees received

B.S. Agriculture, 1963, Oklahoma State University
M.S. Agronomy, 1965, Virginia Tech and State University

Ph.D. Soil Science, 1967, Virginia Tech and State University

Professional positions held

2009-2012 Director of UK Research and Education Center, Princeton
1969-present University of Kentucky
Extension Assistant Professor of Agronomy, 1969-1975
Extension Associate Professor of Agronomy, 1975-1980
Extension Professor of Agronomy, 1980-present
1966-69 U.S. Army, Captain

Honors and awards received since baccalaureate degree

Fellow, American Society of Agronomy, 2002
Excellence in Publication Award, ASA, 1998, 2001, 2004, 2007
Excellence in Extension Award, National Assoc. of Wheat Growers, 1998
Association of Kentucky Extension Specialists:
Outstanding Project Award, 1999
Outstanding Extension Program, 1984
Outstanding Extension Specialist, 1983
Outstanding Extension Program - Integrated Pest Management Team, 1979
Outstanding Extension Program - Wheat Science Group, 2006
Ky. Small Grain Growers Association:
Distinguished Research Award, 1994
Recipient of Research Tour to Europe, 1996
Distinguished Service Award, Ky. Assoc. of Conservation Districts, 1985
Kentucky 4-H:
Outstanding Dedication and Service, 1997
Meritorious Service Award, 1996
4-H Leader Award for Soil Judging Leadership, 1989, 1990, 1991
Team Teaching Award, Ohio Chapter Epsilon Sigma Phi, 1994
Kentucky CCA Organization – Exemplified Leadership Recognition, 2003
Kentucky Association of Agricultural Agents – Outstanding State Specialist Award, 2004
USDA – CSREES Partnership Integration Award, 2008
Southern Region IPM Pulling Together Award, 2008

International Experience

Served on agricultural design teams or as a consultant to agriculture groups for soil and soil fertility improvements in Thailand, Ecuador and Bangladesh. Received invitations and participated in International Symposiums on minimum tillage in China, Mexico, Bangladesh, England, France and Thailand.

Research

Applied Research program and involving crops such as corn, soybeans, wheat, canola or forages. Listed below are some of the subjects researched:

- Nitrogen inhibitors and additives
- Nitrogen rates and timing
- No-tillage on wheat, corn and soybean
- Erosion on soil productivity
- High yield alfalfa, corn, soybeans and wheat
- Fertilizer requirements for no-till
- Nitrogen sensors as a fertilizer guide
- Soil compaction and soil penetrometers
- Soybean inoculants
- Chlorophyll meter
- Water quality
- and others

Publications

Publications have primarily been directed towards the public and professional recommenders. Most of the publications are summarized below:

Abstracts, Newsletters, News Releases, and others	-	249
University and Extension Publications	-	320
Journals and Published Proceedings	-	114
Book Chapters	-	11
Popular Press Articles	-	436

Extension Activities and Programming

Service to the Extension agents, agribusiness, producers and the general public through Extension programming and activities.

Listed below are many of the programs that have been a part of this.

1. Soil Compaction, its detection, correction, and prevention.
2. Efficient use of fertilizers and lime.
3. Computerization of soil fertility recommendations.
4. Development and use of soil nitrate testing, soil nitrate sensors and chlorophyll meters for better nitrogen use efficiency.
5. Improving and recommending the use of nitrogen (rates, timing, methods) for no-tillage crop production in Kentucky.
6. Increasing the adoption of no-tillage in Kentucky and describing its effects on soils.
7. Educating and controlling erosion and proving its long term effects.
8. Accurate soil sampling and interpretations within tillage methods and precision agriculture.

ROBERT (BOB) C. PEARCE

Associate Extension Professor of Agronomy: Tobacco Production
20% Research: 80% Extension

PhD. Soil Chemistry, 1994, University of Georgia.
Dissertation Title: Salt sorption behavior in acid subsoils and synthetic Goetite amended with Gypsum.

M.S. Soil Science, 1989, University of Kentucky.
Thesis Title: The importance of stored soil moisture for double crop soybean.

B.S. Agronomy, 1987, University of Kentucky.

Program Description:

Tobacco growers across Kentucky are struggling to adjust to an uncertain future. Burley tobacco contract volume was cut an estimated 20 to 30% in the spring of 2010, with a large number

of growers dropped entirely. Those who remained face growing concerns over impending regulation of the tobacco industry, future contract volumes, and problems with leaf quality (3 of the last 4 curing season have resulted in undesirable leaf quality). My extension and research programs have continued to evolve to keep pace with the rapidly changing tobacco industry in Kentucky. With the high degree of uncertainly, the volume of agent calls, client calls, field visits, and consultations has remained strong, placing significant demands on my time. However I believe that these direct interactions are critical for me to maintain a responsive and relevant extension program in burley tobacco. The tobacco extension team (specialists from different departments with tobacco responsibilities) has had several very successful collaborations in recent years including the Innovative Tobacco Grower Program (ITGP) and the comprehensive Tobacco Production Guide (ID-160). I was the lead coordinator of ITGP at its inception and continue to play a major role in directing this program. I am co-editor on the production guide. Both of these resources were developed with the purpose to rapidly get information on new growing methods into the hands of growers.

The goals of my applied research program have always been closely aligned with the objectives of my Extension programs. Much like the extension program, my research program has also undergone significant changes in the last two years. While I am still active in core areas like no-till tobacco production, and nitrogen fertilizer management, I have increased my efforts in the area of sucker control and management for the reduction of Tobacco Specific Nitrosamines (TSNAs). I am confident that my extension program is currently meeting the needs of county agents and burley tobacco growers in Kentucky and surrounding states. The challenge is to maintain a sufficient applied research program to continue to meet those needs into the future and help tobacco growers' transition to life under FDA regulation of the tobacco industry.

PUBLICATIONS

Book Chapters:

Wendroth, O., E.L. Ritchey, S. Nambuthiri, J.H. Grove, and **R.C. Pearce**. 2011. Spatial variability of soil physical properties. In: Gliński, J., J. Horabik, and J. Lipiec (Eds.), Encyclopedia of Agrophysics. Springer, Heidelberg, Germany. (in press).

Extension publications: (Internal Peer Review)

Purschwitz, M. A., **B. C. Pearce**, and K. W. Seebold. 2009. Protect Yourself and Your Workers from Dusts and Molds on Cured Tobacco. UK Cooperative Extension/Health Education through Extension Leadership (HEEL) special publication. http://www.uky.edu/Ag/Tobacco/Pdf/TobaccoMold.pdf

Pearce, B., B. Miller, and E. Ritchey. 2009. The Effects of Variety, Harvest Management, and Curing Environment On Cured Leaf Quality of Burley Tobacco. Tobacco Factsheet #1-09.

Pearce, B., J. Zeleznik, and C. Fisher. 2009. Tobacco Float Media Test 2008. Tobacco Factsheet #2-09.

Wilhoit, J. and **B. Pearce**. 2009. Burley Tobacco Curing Advisory. Tobacco Factsheet #4-09.

Bailey A., G. Palmer, and **B. Pearce**. 2009. Topping, Sucker Control, and Harvest Management for Burley and Dark Tobacco. In *2009-2010 Kentucky Tobacco Production Guide*. ID-160. Ed. K. Seebold and B. Pearce.

Pearce B., P Denton, and A. Bailey. 2009. Introduction. In *2009-2010 Kentucky Tobacco Production Guide*. ID-160. Ed. K. Seebold and B. Pearce.

Pearce, B., P. Denton, A. Bailey, and G. Palmer. 2009. Selecting Burley Tobacco Varieties. In *2009-2010 Kentucky Tobacco Production Guide*. ID-160. Ed. K. Seebold and B. Pearce.

Pearce B., G Palmer, A. Bailey, K. Seebold, and L. Townsend. 2009. Management of Tobacco Float Systems. In *2009-2010 Kentucky Tobacco Production Guide*. ID-160. Ed. K. Seebold and B. Pearce.

Pearce B., and G. Schwab. 2009. Field Selection, Tillage, and Fertilization. In *2009-2010 Kentucky Tobacco Production Guide*. ID-160. Ed. K. Seebold and B. Pearce.

Extension Publications (in review):

Ritchey E.L. and **B. Pearce**. 2010. Tillage and Subsoiling Effects on Soil Compaction and Yield of Burley Tobacco. Submitted for *Agronomy Notes*.

Invited Presentation:

2011. The role of soil conservation practices in sustainable leaf tobacco production. 2011 CORESTA Agro-Phyto Congress. Sanitago, Chile Nov. 6-10. 2011.

Sharyn Elaine Perry

Faculty Positions

Assistant Professor, Dept. of Agronomy (later Plant and Soil Sciences), Univ. of Kentucky, 1998
Associate Professor, Department of Plant and Soil Sciences, University of Kentucky, 2004
Position: Plant Biochemistry, 76% Research; 14% Instruction; 10% co-Director of Undergraduate Studies for Agricultural Biotechnology

Education

B.S. University of Michigan-Dearborn, 1987, Biochemistry

Ph.D. University of Wisconsin-Madison, 1993, Cell and Molecular Biology
Postdoctoral Fellow, University of Wisconsin-Madison, 1993-1998,

Plant Molecular Biology

Program Description

My lab group is particularly interested in the first phase of plant development, the embryonic phase. Early embryo development in higher plants has been difficult to study because the cells are relatively inaccessible. Consequently, little is known at a molecular level about this stage of development. Somatic embryogenesis (SE) serves as a more accessible model for zygotic processes, but little is understood about mechanisms involved in promoting dedifferentiation and redifferentiation as tissue with embryo identity. Understanding this process is important to agriculture because in general, genetic engineering for value-added crops requires regeneration of transgenic plants via either SE or organogenesis, and many plants or cultivars are recalcitrant to these processes. Use of somatic embryogenesis as a model for zygotic processes is also important because of the prevalence of seeds in the human diet (~70% directly from seeds and most of the remainder indirectly from seeds).

My lab has focused on a transcription factor (TF) called AGL15 that is a member of the MADS-domain family of TFs that bind to DNA in a sequence specific manner and drive developmental processes by regulating downstream genes. Ectopic expression of *AGL15* promotes SE development in at least two systems in the model plant Arabidopsis, and causes long-term maintenance (over 15 years to date) of development in embryonic mode. Loss-of-function of AGL15, and in some systems the closely related and, at least in some processes, redundant factor AGL18, causes significant reduction in ability to promote somatic embryogenesis. We have extended our findings to an important crop, *Glycine max* (soybean) and have found that a gene encoding an AGL15 ortholog from soybean appears to promote somatic embryogenesis in soybean when overexpressed. Current work in the lab involves understanding how AGL15 has these effects, primarily by determining genes controlled by this protein. We are also investigating the roles that targets of AGL15 play in embryogenesis with a long-term goal to understand regulatory networks active in plant embryo development.

Current Research Support

- S. Perry. NSF-IOS-0922845: ARRA: Transcriptional regulatory networks controlling higher plant embryogenesis. August 15, 2009 to August 14, 2012, $300,000.
- S. Perry. United Soybean Board 0282/1282/2282: Enhancement of soybean somatic embryo development to improve regeneration and

transformation efficiency. Jan. 1, 2010 to Dec. 31, 2012, $236,827.

Select Publications (most related to current work research focus)

1. Zheng, Y., and S.E. Perry. (2011). Chapter 16: Chromatin Immunoprecipitation to Verify or to Identify in Vivo Protein-DNA Interactions. In MIMB volume **754**, 277-291.
2. Nakaminami, K., K. Hill, S.E. Perry, N. Sentoku, J.A. Long and D.T. Karlson. (2009). Arabidopsis Cold Shock Domain Proteins: Relationships to Floral and Silique Development. *Journal of Experimental Botany* **60**, 1047-1062.
3. Zheng, Y., N. Ren, H. Wang, A.J. Stromberg and S.E. Perry (2009). Global Identification of Targets of the Arabidopsis MADS Domain Protein AGAMOUS-Like15. *The Plant Cell* **21**, 2563-2577.
4. Hill, K., H. Wang, and S.E. Perry. (2008). A Transcriptional Repression Motif in the MADS Factor AGL15 is Involved in Recruitment of Histone Deacetylase Complex Components*. The Plant Journal* **53**, 172-185.
5. Thakare, D., W. Tang, K. Hill, and S.E. Perry. (2008). The MADS-Domain Transcriptional Regulator AGAMOUS-LIKE15 Promotes Somatic Embryo Development in Arabidopsis and Soybean. *Plant Physiology* **146**, 1663-1672.
6. Zhu, C., and S.E. Perry. (2005). Control of Expression and Autoregulation of *AGL15*, a Member of the MADS-box Family*. The Plant Journal* **41**, 583-594.
7. Wang, H., L.V. Caruso, A.B. Downie, and S.E. Perry. (2004). The Embryo MADS-Domain Protein AGAMOUS-Like 15 Directly Regulates Expression of a Gene Encoding an Enzyme Involved in Gibberellin Metabolism. *The Plant Cell* **16**, 1206-1219.
8. Wang, H., W. Tang, C. Zhu, and S.E. Perry. (2002). A Chromatin Immunoprecipitation (ChIP) Approach to Isolate Genes Regulated by AGL15, a MADS-Domain Protein that Preferentially Accumulates in Embryos. *The Plant Journal* **32**, 831-843.
9. Tang, W., and S.E. Perry. (2003). Binding Site Selection for the Plant MADS Domain Protein AGL15: an *In vitro* and *In vivo* Study. *The Journal of Biological Chemistry* **278**, 28154-28159.
10. Harding, E.W., W. Tang, K.W. Nichols, D.E. Fernandez, and S.E. Perry. (2003). Expression and Maintenance of Embryogenic Potential is Enhanced Through Constitutive Expression of *AGAMOUS-Like 15*. *Plant Physiology* **133***,* 653-663*.*

Research Mentorship

Advised 5 Ph.D. students, 4 postdoctoral scholars and 2 undergraduate researchers.

Courses Taught

- PLS 622 - Physiology of Plants I. Fall semesters.
- PLS 657 – Seed Biology. Spring semesters of odd years.
- ABT 201 - Scientific Method in Biotechnology. Fall semesters.

Leadership/Service

- Developed and disseminated an approach for chromatin immunoprecipitation (ChIP) in plants. Requests from over 80 laboratories world-wide for a detailed protocol and/or advice on ChIP have been honored.
- Served as a Panel Member for USDA NRICGP/AFRI, 2003, 2005, 2006 and 2010 and for the NSF 2009 and 2011.
- Organizer or participant in a number of outreach activities including mentoring a girl for the "Girls in Science" program, organizing and running workshops for the "Girls in Research" program and, most recently, (Spring 2011) developing and running a workshop for 5th grade students from Lexington schools examining how plants respond to environmental cues. This final workshop in collaboration with Raven Run Nature Sanctuary and involved ~ 50 students per day for 4 days (200 students total) in 2011. Plans are to offer this again in Spring 2012.
- Trained numerous students, postdoctoral scholars, and staff in microscopy techniques and use of equipment in the facility for microscopy (room 344 PSB).
- Co-editor with Dr. Ling Yuan for Methods in Molecular Biology volume 754: Plant Transcription Factors: Methods and Protocols, Humana Press (J.M. Walker, Series Editor), 2011.

Todd Pfeiffer

Faculty Positions

Assistant Professor	Dep. of Agronomy	Univ. of Kentucky	1982
Associate Professor	Dep. of Agronomy	Univ. of Kentucky	1987
Professor	Dep. Plant Soil Sciences	Univ. of Kentucky	1994

Position: Department Chair, Soybean/sorghum breeder
85% administration, 5% research, 10% teaching

Education

B.S. University of Kentucky 1977 Agronomy
M.S. University of Wisconsin 1979 Agronomy
Ph.D. University of Wisconsin 1982 Plant Breeding and Plant Genetics

Program Description

Research

I maintain a small soybean/sweet sorghum breeding program, primarily to complete earlier grant funded projects. For soybean I am currently breeding soybean for edamame production focusing on lipoxygenase free varieties with powdery mildew resistance, a problem in early season tunnel production that is not as prevalent in the normal summer production. With Dr. Morris Bitzer I started a sweet sorghum breeding program at UK. In 2007 KAES and USDA-University of Nebraska jointly released KN Morris, the first male sterile hybrid of sweet sorghum. Current effort focuses on earlier maturing, lodging resistant varieties for syrup production. I believe this sweet sorghum breeding effort will have a positive impact on small acreage Kentucky farmers in the next decade.

Teaching

My recent teaching efforts focused on developing and sustaining the UK Honors Program track ‘World Food Issues’ and teaching the first and third courses in this sequence. Since becoming chair I have continued teaching one section of World Food Issues I each fall semester.

Professional Recognition

‘Fellow of the Society’ American Society of Agronomy, 2003

Graduate Student Advisor

Advised 10 MS and 4 PhD students

Current Research Support

-Todd Pfeiffer (PI); Sweet sorghum improvement, USDA special grants and National Sweet Sorghum Producers and Processors Association

-Todd Pfeiffer (PI); Breeding soybean for edamame and organic black soybean production; USDA special grants

Refereed journal articles (recent year, plus 54 additional for career)

Pfeiffer, T.W., M.J. Bitzer, J.J. Toy and J. F. Pedersen. 2010. Heterosis in sweet sorghum and selection of a new sweet sorghum hybrid for use in syrup production in Appalachia.
Crop Science 50:1788-1794.

ARIETIES AND GERMPLASMS RELEASED

Soybean
-Varieties
Pennyrile 1987 (commodity)
Calhoun 1992 (commodity)
CF 461 1995 (commodity)
CF 492 1995 (commodity)
7499 1998 (commodity)
KY04-ns-309 2009 (black seeded lipoxygenase free food grade)
-Germplasms
Camp - lx2 1997 (lipoxygenase 2 null natto type soybean)
KY98-2047 2004 (extra-dense pubescence)
KY98-2932 2004 (extra-dense pubescence)
Sweet Sorghum
-Hybrid
KN Morris 2007 (male-sterile hybrid for syrup production)

Tim Phillips

Faculty Positions

Assistant Professor, Dep. of Agronomy, Univ. of Kentucky, 1992
Associate Professor, Dep. of Agronomy, Univ. of Kentucky, 1997
Position: Tall fescue breeding and genetics, 85% research, 15% teaching.

Education

B.S. North Carolina State University, 1983, Botany
M.S. North Carolina State University, 1987, Crop Science (peanut breeding)
Ph.D. North Carolina State University, 1992, Crop Science (small grains breeding)

Program Description

Research

My research focuses on applied plant breeding with forage-type tall fescue. I have continued a tradition of working with wide hybridization (crossing tall fescue with ryegrass, meadow fescue and giant fescue) in order to increase variability for traits such as forage quality and seedling vigor. Most of the experimental populations that I have produced are endophyte-free, but I am active in deploying novel endophytes in my elite lines. I also have studied heterosis in strain crosses of tall fescue. I have evaluated palatability of a wide range of tall

fescue varieties using cattle in small plot experiments, and have several current projects aimed at improving acceptability to grazing animals (such as softer leaves and higher succulence). I have access to a flow cytometer with which I have measured genome sizes in several hundred accessions of tall fescue from the W-6 plant introduction station and have used this information in making new synthetics of tall fescue that differ in chromosome number from the normal for tall fescue grown currently (28 and 56 chromosomes vs. 42 as typical for 'Kentucky 31' continental tall fescue), and in making interesting new wide crosses. On a smaller scale, I have breeding programs in orchardgrass, timothy, smooth bromegrass, meadow fescue, and festulolium, as well as several native warm season grass species.

For several years I have been working with David Hildebrand with *Salvia hispanica*, commonly known as chia. We were successful in using mutagenesis to produce lines that flower under long days and produce a seed crop in Kentucky. I have conducted field research for the past three seasons to study row spacing, seeding rates, seeding dates, and fertilizer response, as well as agronomic characterization of our mutant lines.

I have developed six roses for which the UK Arboretum has auctioned off the naming rights for fund-raising.

Teaching:

I have taught a class in grass taxonomy and identification for 13 years, and have co-taught an introductory class in plant identification for three years.

Professional Recognition

Merit Award, American Forage and Grassland Council, 2003.

National Service

S-009 Regional Technical Advisory Committee- member and served as secretary, president.
NE-1010 Regional Technical Advisory Committee member.
Grass Variety Review Board member.

Graduate Student Advisor

Advised 2 MS and 3 PhD students.

Current Research Support

-Tim Phillips, USDA-ARS-FAPRU SCA- Improving tall fescue by using novel endophytes and selecting for more palatable plants. $32,000/yr, 2006-2011.
- David Hildebrand and Tim Phillips, Kentucky Small Grain Growers Association- Development of long day-flowering chia. $25,000 total over 3 years (2010-2012)

Refereed journal articles (current year, plus 33 additional for career)

- Handayani, I.P., M.S. Coyne, and **T.D. Phillips**. 2010. Soil Organic Carbon Fractions Differ in Two Contrasting Tall Fescue Systems. Journal of Plant and Soil Science. DOI:10.1007/s11104-010-0352-z
-J. A. Siegrist, R. L. McCulley, L. P. Bush, and **T. D. Phillips**. 2010. Alkaloids may not be responsible for endophyte-associated reductions in tall fescue decomposition rates. Functional Ecology 24:460-468, DOI:10:1111/j.1365-2435.2009.01649.x
-Stefaniak, Thomas R., **T.D. Phillips**, C. A. Rodgers, R. VanDyke, and D.Williams. 2009. The inheritance of Cold Tolerance and Turf Traits in a Seeded Bermudagrass Population. *Crop Science* 49:1489-1495.
-Stork, J., Montross, M., Smith, R., Schwer, L., Chen, W., Reynolds, M., **Phillips, T**., Coolong, T. And Debolt, S. (2009), Regional examination shows potential for native feedstock options for cellulosic biofuel production. GCB Bioenergy, 1: 230–239. doi: 10.1111/j.1757-1707.2009.01015.x

VARIETIES AND GERMPLASMS RELEASED

Tall fescue
-Varieties
KYTF2, 1997 and KYFA9304, 2004
-Germplasm
13 monosomic stock plants released in collaboration with USDA-ARS in 1994.
Orchardgrass
-Varieties
Prairie, 2004 and KY07G23-335, 1997
-Germplasm
KY07G23-334 and KY07G23-336, 1997
Timothy
-Varieties
KY-Early, 1997, KY-Leafy (germplasm), 1997.

Edwin L. Ritchey, PhD, CPSS

Faculty Positions

Assistant Extension Professor, Employed Oct. 1, 2010
Position: Extension Soils Specialist, 80% Extension, 20% Research

Education

B.S., Natural Resources Management (Envir. Mgt), UT-Martin – Dec. 1995
M.S., Plant and Soil Sciences (Soil Management), UT-Knoxville - May 1999
Ph.D., Soil Science, University of Kentucky – Feb. 2010

Program Description

Research (20%)

My applied research focuses on optimizing production practices in agronomic crops common to Kentucky and often involves utilizing "organic waste products" such as manures in the system. The cost of many animal manures are often well less than the value of the nutrients contained within the manures. Many additional benefits are realized above the N, P, and K, such as secondary and micronutrients and the influence of organic matter to soil nutrient supply and water holding capacity. I would like to quantify these additional benefits. I am in the process in determining/refining nutrient release rates of different manure types materials to better utilize these sources to supply plant nutrients. Nutrient release rates are also being studied for tobacco stalks and corn residue to aide in understanding of interactions of timing and plant uptake of nutrients and soil test results.

Extension (80%)

Developing relationships with county agents, producers, and other industry partners allows me to be in tune with the ever changing dynamics associated crop production in Kentucky. With this network in place I am better able to identify current issues plaguing area stakeholders and provide timely and scientifically sound answers in return. My focus is largely on nutrient management with an emphasis in manure and other "organic residues and products". Soil management issues like tillage, residue management, and compaction also are high priorities to my program. Outreach venues include, meetings, conferences, extension publications, radio tapes, popular press articles, and personal interaction to deliver sound answers in a timely manner.

Service

Board Member for Kentucky Certified Crop Advisors Association
Committee Member for NCERA 103 Specialized Soil Amendments and Products…
UK Representative for North Central Extension-Industry Soil Fertility Conference
Stakeholder with USDA-ARS-AWMRU
Soil Commodity/Resource Group
Committee Member for Kentuckiana Certified Crop Advisors Meeting
Agent In-service: Soils
Journal (1) and Departmental Manuscript Review (5)

Student Advising

Committee member (1) MS and (1) PhD
Undergraduate advisor for one special project

Current Research Support

Ritchey, E.L. 2011-2012. Survey of the Tissue Nutrient Status of Winter Wheat in Kentucky. Kentucky Small Grain Research Board. ($4,000).
Ritchey, E.L., J.H. Grove, C.D. Lee, and G.J. Schwab. 2010-2011. Understanding Components to High Yielding Soybean Production Systems. Kentucky Soybean Promotion Board and The Mosaic Company. (KSPB 20,000; Mosaic 10,000) Year one of three.
Ritchey, E. L., L.W. Murdock, J.H. Grove, and G. J. Schwab. 2010-2011. The Ripper Challenge: Is Compaction Really Reducing Soybean and Corn Yields? Kentucky Soybean Promotion Board. ($25,888)
Schwab, G. J. and E. L. Ritchey. 2010-2011. Survey of the Tissue Nutrient Status of Winter Wheat in Kentucky. Kentucky Small Grain Research Board. ($4,000) Involved 15 county ANR agents and 27 farms.
KY Corn Growers Association provided funding to purchase a research quality manure spreader ($23,000) to conduct manure research, for Kentucky corn producers.

Refereed Publications

Wendroth, O., E.L. Ritchey, S, Nambuthiri, J.H. Grove, and R.C. Pearce. *Spatial variability of soil physical properties*. P. 827-839. *In* G. Glinski, J. Horabik, and J. Lipiec (eds.) Encyclopedia of Agrophysics. Springer. Heidelberg, Germany.

Ritchey, E.L., R.C. Pearce, and J.H. Grove. *The implications of subsurface tillage on soil compaction in two different tillage systems*. To be submitted to Soil and Tillage Research. (In preparation)

Extension Publications

Ritchey, E. L. 2011. Improving the Productivity of Landscapes with Little or No Topsoil AGR-203 (New)

Cogger, C. and E. L. Ritchey. 2011. Soils and Fertility: Kentucky Master Gardener Manual Chapter 4. AGR-204 (major revision)

Frank J. Sikora

Soil Testing Coordinator, Division of Regulatory Services, Univ. of Kentucky, 1998
Adjunct Associate Professor, Dep. Plant Soil Sciences, Univ. of Kentucky, 1998
Adjunct Associate Professor, Dep. Agronomy Soils, Auburn University, 1991.
Research Chemist, TVA Environmental Research Center, Muscle Shoals, AL, 1987
Postdoctoral Associate, Dep. Agronomy, Cornell Univ., 1986
Current Position: Direct Soil Testing services offered by the University of Kentucky

Education

Ph.D., Agronomy, May 1986, University of Illinois, Urbana, IL
M.S., Plant and Soil Science, December 1982, University of Tennessee, Knoxville, TN B.S., Plant and Soil Science, May 1980, West Virginia University, Morgantown, WV

Program Description

The mission of the Soil Testing Laboratory is to help citizens of Kentucky maintain productive and economical plant growth operations by offering tests on soils, water, greenhouse media, and animal waste with subsequent fertilizer and lime recommendations. This mission is carried out with laboratory analysis, interpretation of results, education of clients, and development of improved methods. Two laboratories provide services of soil testing. One laboratory is located in Lexington and the other is located at the Princeton Research and Education Center. Both laboratories are similarly equipped to perform the routine soil test for pH and nutrients. Additional tests offered are the presidedress nitrate test (PSNT) in soil at Princeton and several other soil, water, greenhouse and animal waste tests at Lexington.
Objectives of the Soil Testing Laboratory include the following.
1. Provide soil test results and unbiased lime and fertilizer recommendations to agriculture producers and homeowners.
2. Provide laboratory testing for other miscellaneous materials related to plant growth operations such as animal waste, greenhouse media, and water.

3. Provide testing services for various research projects in the College of Agriculture.
4. Educate students and county office staff on various aspects of our soil testing services.
5. Develop improvements in laboratory methodology to improve efficiency in operations and accuracy of results.

National Service

North American Proficiency Testing (NAPT) Program Oversight Committee, 2011-2013
Soil and Plant Analysis Council, 2011-2013.
Chair of S8 Division (Nutrient Management and Soil and Plant Analysis) in the Soil Science Society of America, 2010-2013.
Editorial Board of Communications in Soil Science and Plant Analysis, 2009-2011.
Chairing a subcommittee under SERA-IEG-6 committee for developing a soil laboratory manual with Southeastern US methods, 2009-present.
Administrative council to Southern Extension and Research Activity Information Exchange Group 6 (SERA-IEG6) on soil testing and plant analysis, 2007-2013.
North American Proficiency Testing (NAPT) Program Oversight Committee, 2003-2008.
Associate Editor for the Soil Science Society of America Journal in the division of Nutrient Management and Soil & Plant Analysis, 2002-2007.

Soil and Plant Analysis Council, 2000-2002.

Student Service

Served on student advisory committees (6 M.S. and 2 Ph.D.)
Advised research of 2 undergraduate students
Taught Plant and Soil Relationships (PLS650) for 11 semesters

Refereed Journal Articles (2011 to current, 47 total for career)

Sikora, F.J. 2012. Double-buffer methods revisited with focus on ionic strength and soil:solution ratio. Soil Sci. Soc. Am. J. (in press).
Chien, S.H., F.J. Sikora, R.J. Gilkes, and M.J. McLaughlin. 2012. Comparing of the difference and balance methods to calculate percent recovery of fertilizer phosphorus applied to soils: a critical discussion. Nutr Cycl Agroecosyst 92: 1-8.

Sikora, F.J., P. Howe, D.Reid, D. Morgan, and E. Zimmer. 2011. Adopting a robotic pH instrument for soil and soil-buffer pH measurements in a soil test laboratory. Comm. Soil Sci. and Plant Anal. 42:617-632.

Laboratory Methods Developed

1 M KCl soil pH and Sikora buffer pH for determining lime requirement (2010). 1 M KCl soil pH removes lower than expected pH in water with dry soil conditions in the fall.

Moore-Sikora buffer method for lime requirement (2008). A buffer was developed to replace Adams-Evans buffer which contains carcinogenic chemicals. Number of google hits on "Moore Sikora buffer" (Dec 2010: 265, Dec 2011: 877)

Sikora buffer method for lime requirement (2006). A buffer was developed to replace the SMP buffer which contains carcinogenic chemicals. Number of google hits on "Sikora buffer" & -"Moore Sikora" (Dec 2010: 264, Dec 2011: 640).

Jan Smalle

Faculty Positions

Assistant Professor, Dep. of Agronomy, Univ. of Kentucky, 2004
Associate Professor, Dep. of Plant Soil Sciences, Univ. of Kentucky, 2010
Position: 85% research, 15% teaching

Education

B.S. Ghent University, 1987, Plant Biotechnology
Ph.D. Ghent University, 1989, Plant Genetics

Program Description

Research
My research currently contains three partially overlapping areas of interest. First, we study the various roles of ubiquitin/proteasome-dependent proteolysis in plant stress responses. Our work has identified essential roles played by 26S and 20S proteasomes in the response to heat shock, oxidative stress, salt stress and exposure to TiO_2 nanoparticles.
With our second research focus we analyze the flavonoid biosynthesis pathway, particularly the proteolysis controls that limit the activities of some of the key enzymes involved. In parallel to these protein degradation studies, we are developing a method for the isolation of flavonoids from plants by using TiO_2 nanoparticles.
Our third research focus involves the proteolysis control points in the cytokinin response pathway. We find that several of the key signaltransduction proteins in this pathway are targeted for cytokinin-regulated and 26S proteasome-dependent degradation. Our main aim is to determine to what extent these protein stability controls contribute to the strength and the duration of the cytokinin response. In addition, we aim to identify the ubiquitin/26S proteasome pathway components that specifically interact with the cytokinin signaling proteins and label them for degradation.

Teaching
I teach 50% of the undergraduate course PLS/BIO210 and 14% of the graduate course PLS623. The PLS623 course has recently been redesigned and my contribution will increase to 75% the next time it is offered in 2012.

National Service

-NSF review panels, Fall of 2010 and Spring of 2011.

Graduate Student Advisor

I am currently advising one graduate student.

Current Research Suppor
t

- Jan Smalle; Molecular genetic analysis of a novel feedback inhibition mechanism in the cytokinin response pathway, NSF-IOS: 2009 – 2012; $400,000
- Jan Smalle; 26S proteasome-dependent proteolysis: a cause of low recombinant protein yields in plants? Kentucky Tobacco Research & Development Center (KTRDC); 2010 – 2011; $26,755

- Smalle J., Tang G., Yuan L., Zhu H; Regulation of flavonoid biosynthesis through posttranscriptional control of pathway enzymes and transcriptional regulators; KTRDC: 2009 – 2011; $500,000 ($125,000 for my program).

Refereed journal articles
(current year, plus 28 additional for career)

- S. Wang, J. Kurepa, T. Hashimoto and J. Smalle (2011). Salt stress-induced disassembly of Arabidopsis cortical microtubule arrays involves 26S proteasome-dependent degradation of SPIRAL1. The Plant Cell. 23, 3412-3427.
- J. Kurepa and J. Smalle (2011). Assaying transcription factor stability. Methods Mol Biol. 754, 219-234.
- S. Wang, J. Kurepa and J. Smalle (2011). Ultra-small TiO(2) nanoparticles disrupt microtubular networks in Arabidopsis thaliana. Plant Cell Environ. 34, 811-820.

S. Ray Smith
Extension Professor, Forage Extension Specialist

Education
PhD - 1991. University of Georgia, Agronomy
MS - 1987. University of Georgia, Agronomy
BSc - 1983. Asbury College, Wilmore, KY, Biology

Academic Positions
Professor, Department of Plant and Soil Sciences, Univ of Kentucky. December 2010 – Present.
Associate Professor, Dept of Plant and Soil Sciences, Univ of Kentucky. December 2004 – 2010.
Associate Professor, Dept of Crop and Soil Environ. Sciences, Virginia Tech. April 2001 – Dec 2004.
Associate Professor, Plant Science Department, Univ of Manitoba, Canada. April 1996 – April 2001.
Assistant Professor, Plant Science Dept, Univ of Manitoba, Canada. January 1991 – April 1996.

Overview

The primary objective of my forage extension/research program is to develop and extend applied research information to extension agents, producers, and landowners throughout Kentucky. A secondary objective is to provide leadership in forage programming and initiatives on a regional and national basis.

During the past year I organized and distributed nitrate test strips and instructions to county agents and I worked with Dr. Gaskill to develop a rapid ergovaline (toxin in tall fescue) testing procedure and integrate it into the Veterinary Diagnostic Lab list of services. I am very involved with the Master Programs delivered around the state. Garry Lacefield and I share the responsibility for delivering the Forage session of Master Cattleman, many of the Master Grazer sessions, and two sessions of the Advanced Master Cattleman, and the forage section of the new Master Stocker program. We have averaged 25 sessions per year over the last two years and work with the Master Grazer coordinator to keep up with the 60+ grazing demonstration farms that have been established around the state.

One of the major extension/applied research initiatives that I started in Kentucky is the Switchgrass for Biomass Project involving 20 farms (5 acres each) in 12 counties across N.E. Kentucky where switchgrass was established, managed, and harvested. We have worked closely with East KY Power Cooperative to utilize the biomass produced for electricity generation and have worked with a major pelleting plant to develop an easily transported and used product.

I lead the Horse Pasture Evaluation Program. From 2005 – 2011 we have provided detailed evaluations for over 100 horse farms in the state. This program was recognized at the World Equestrian Games, helping the UK Equine Initiative gain status across the country and internationally.

I also facilitate interaction and collaboration between extension, research, and teaching colleagues in forage and biomass projects and programs. I helped initiate a Forage/Grassland discussion group for graduate students and faculty. I have ongoing collaborations with many other faculty in our department, Animal Science, Biosystems, Horticulture, Ag. Economics, and USDA-ARS-FAPRU. I have developed collaborative partnerships with other schools in the state including: a project with Eastern Kentucky University in biomass research and extension, the formation of a joint Berea/UK Grazing School, and a partnership with Asbury University to deliver educational sessions at their annual Draft Horse Field Day. I was elected Vice President of the American Forage and Grassland Council (AFGC). As I move into the AFGC President’s position over the next two years, I look forward to facilitating collaboration between all sectors of the forage industry in the U.S. including the Public Sector, Producers, and Companies.

Honors and Awards (since joining UK)
Garry Lacefield Public Sector Award, KY Alfalfa Conference. 2009.
KFGC Public Award State. Kentucky Forage and Grassland Council. 2008.
UK Outstanding Project Award, UK Horse Pasture Evaluation Program. 2008
American Forage and Grassland Association Merit Award, 2005

Grants and Synergistic Activities (current)
-D. Amarl-Phillips, PI (45%), S.R. Smith, Co-PI (25%), Other faculty at 5 to 10%, Project: Master Grazer Program, Agency: Ag. Development Board, Initiation: 2008, Amount: ~$175,000
-M. Montross (40%), S. DeBolt (40%), and S.R. Smith (20%),Project: Developing a Biomass Energy Crop Trial for Renewable Energy Production Agency: New Crop Opportunities Grant, Initiation: 2009, Amount: $24,716
-S.R. Smith, PI (60%), T. Keene (40%), Project: Evaluating Horse Pastures in Central Kentucky, Agency: USDA-SCA, Initiation: 2008, Amount: $360,464
-S.R. Smith, PI (50%), T. Keene (50%), Project: Expanding Opportunities for Biomass and Hay Production, Agency: KY Forage and Grassland Council, Initiation: 2007, Amount: $455,658
-S. R. Smith, PI (30%), S. Rudd (30%), G. Olson (30%), G. Lacefield (10%), Project: Biomass Field Trials, Agency: Ceres (Blade Energy Crops), Initiation: 2008, Amount: $150,889
-L. Anderson, PI (20%), S.R. Smith (6%), Many CA faculty, Project: Master Cattleman, Agency: Agriculture Development Board, Initiation:2008, Amount: ~$250,000

Refereed Journal Publications (since 2009) - *graduate student
-DeBolt, S, E. Campbell, S.R. Smith, and J. Stork. 2009. Life cycle assessment of native plants and marginal lands for bioenergy agriculture. Global Change Biology Bioenergy.
-Smith, S. Ray, Laura Schwer, and Thomas C. Keene. 2009. Tall fescue toxicity for horses: literature review and Kentucky’s successful pasture evaluation program. Online. Forage and Grazinglands
-Stork, J., M. Montross, R. Smith, L. Schwer, W. Chen, M. Reynolds, T. Phillips, T. Coolong, and S. DeBolt. 2009. Regional examination shows potential for native feedstock options for cellulosic biofuel production. Online. Global Change Biology Bioenergy doi: 10.1111/j.1757-1707.2009.01015.x
-*Morrison, J.I., S.R. Smith, and G.E. Aiken, and L.M. Lawrence. 2009. Composition of horse diets on cool-season grass pastures

using microhistological analysis. Online. Forage and Grazinglands

Selected Papers in refereed conference proceedings (since 2009)
- * graduate student
-Smith, S.R., T.C. Keene, *L. Schwer, C. Otto, S. DeBolt, and M. Montross. 2009. Relationship between forage quality and biofuel quality in warm season native grasses. *In* Proc. of the AFGC Annual Meeting.
-*Schwer, L., S.R. Smith, C. Huo, T.C. Keene, J. Lowry, G. Roberts, and *J.I. Morrison. 2009. Fall nitrogen applications for horse pastures. *In* Proceedings of the AFGC Annual Meeting.
-Keene, T.C., S.R. Smith, and *L. Schwer. 2009. Switchgrass biomass production on northeastern Kentucky farms. *In* Proceedings of the AFGC Annual Meeting.

Refereed Extension Publications (since 2009)
-Smith, S.R. et. al. 2010. Establishing switchgrass for biomass.
-Smith, S.R. et. al. 2010. Managing switchgrass for biomass.
-Halich, G. and S.R. Smith. 2009. Switchgrass vs. hay comparative budgets.
-Ditsch, D.C., S. R. Smith, and G.D. Lacefield. 2009. Bermudagrass: a summer forage in Kentucky.
-Halich, G. and S.R. Smith. 2009. Optimal Nitrogen Application Rates for Stockpiling Tall Fescue Pastures: 2009 Guide. AEC 2009-09.
-Vincelli, P., S.R. Smith, and C. Finneseth. 2009. Sampling for the tall fescue endophyte in pasture and hay stands. PPA-30.
-Smith, S.R. and G.D. Lacefield, and P. Vincelli. 2009. “Emergency” inoculation for poorly nodulated legumes. PPRS-AG-F-04.
-Smith, S.R. and G. Lacefield. 2009. Renovating hay and pasture fields. AGR-26. ww
-Smith, S.R., G. Lacefield, and T. Keene. 2009. Native warm-season perennial grasses for forage in Kentucky. AGR-145.
-Halich, G. and S.R. Smith. 2009. Profitability of Spring Hayfield Nitrogen Applications. AEC 2009-02.

Olga Tsyusko

Positions:
Scientist I, Department of Plant and Soil Sciences, University of Kentucky, 2008-2011
Molecular Biologist, Savannah River Ecol. Lab., Univ. of Georgia, Aiken, SC, 2007-2008
Postdoctoral Research Assoc., Savannah River Ecol. Lab., Univ. of GA,

Aiken, SC, 2004-2006

Current Position: Assistant Research Professor, Dept. of Plant and Soil Sciences, Univ. of Kentucky, 2011, 100% research

Education

B.S. Uzhgorod National Univ., Ukraine 1995, Biology
Ph.D. Univ. of Georgia, Athens, GA, 2004, Toxicology

Program Description

My research focuses on toxicogenomic effects of contaminants and stressors such as nanomaterials and radiation on soil invertebrates (nematodes and earthworms) and plants. I am interested in specific genetic signatures as biomarkers of the exposure and toxicity mechanisms of pristine and modified nanomaterials once they enter living organisms. I am investigating toxicity and transcriptomic effects of silver and gold nanomaterials on the ecoreceptors, soil nematodes and earthworm, using various genomic tools. I am a member of the Center for Environmental Implications of Nanotechnology (CEINT) and also member (Co-I) of the Transatlantic Initiative for Nanotechnology and the Environment (TINE) center. These studies of molecular responses of soil invertebrates are providing key insights in to the mechanisms of toxicity of engineered nanomaterials as compared to metal ions. As a result of these studies, I served as an invited international expert at two high profile workshops on environmental effects of nanomaterials at Clemson University in Clemson, SC and at Aveiro University in Aveiro, Portugal.

In addition to studying effects of nanomaterials, I am interested in studying plant and animal evolution as a result of contaminants and environmental stressors (such as germline mutations induced by ionizing radiation) and also from natural ecological processes (evolution of plant breeding systems). For example, I continue collaboration with Dr. Travis Glenn at the University of Georgia studying multigenerational effects of ionizing radiation on plant and animals from Chornobyl areas and also in controlled lab environment. I have worked in this area previously and have an extensive expertise and intend to continue extending this application to emerging contaminants. In addition, I am also collaborating with Dr. Steve Weller’s group from the University of CA-Irvine on publishing results from our last joint NSF grant studying changes in breeding systems in a polyploid plant. For both evolution projects I am using DNA fragment analysis, the technique that I helped to start

previously at AGTC and which now is widely available to the researchers at UK. These studies are providing key insights into the evolutionary history of plants and animals and how genetic diversity might be affected by environmental stressors.

Graduate Student Advisor

Graduate Students: Daniel Starnes (Ph.D. Soil Sciences)
Graduate Committees: Emily Oostveen (MS, Soil Science), Ricky Lewis (MS, Soil Science) – as non-voting committee member
Technician Advisor: Greg Joice

Current Research Support

-Jason Unrine (PI), Olga Tsyusko (Co-I), Ursula Graham, Allan Butterfield, Paul Bertsch. Environmental behavior and bioavailability of Ag and CeO_2 nanoparticles: the role of surface functionalization and its interaction with natural organic substances and iron oxohydroxides. U.S. EPA; 2011-2015; $599,840. .
-Jason Unrine (PI), Paul Bertsch, Olga Tsyusko(Co-I), Andrew Neal. Fate and Effects of Nanosized Metal Particles Examined Along a Simulated Terrestrial Food Chain Using Genomic and Microspectroscopic Techniques, United States Environmental Protection Agency; 2007-2011; $397,000.
-Paul Bertsch (PI), Jason Unrine, Olga Tsyusko(Co-I), Dave McNear, Nadine Kabengi, Greg Lowry, Mark Wiesner, Elizabeth Casman, Steve McGrath, Claus Svendson, David Spurgeon, Stephen Lofts, Andrew Neal, Bruce Jefferson, Sophie Rocks. The Transatlantic Initiative for Nanotechnology and the Environment (TINE), U.S EPA, United Kingdom National Environmental Research Council; 2010-2014; $2,000,000.

Refereed journal articles (5 in 2011, 28 total)

- Handy Richard D., Geert Cornelis, Teresa Fernandes, Olga Tsyusko, Alan Decho, Tara Sabo-Attwood, Chris Metcalfe, Jeffery A. Steevens, Stephen J. Klaine, Albert A. Koelmans, Nina Horne. Ecotoxicity test methods for engineered nanomaterials: practical experiences and recommendations from the bench. *In Press*. *Journal of Environmental Toxicology and Chemistry*. doi: 10.1002/etc.706.

-W. Aaron. Shoults-Wilson, Brian C. Reinsch, Olga V. Tsyusko, Paul M. Bertsch, Greg V. Lowry, Jason M. Unrine. 2011. Role of particle surface coating for bioaccumulation and reproductive toxicity of silver in earthworms (*Eisenia fetida*) exposed to silver nanoparticles. *Nanotoxicology* 5(3): 432-444.
-Tsyusko O., T. Glenn, K. Jones, K. Aizawa, T. Hinton, Yi Yi, and Dan Coughlin. 2011. Differential Genetic Responses to Ionizing Irradiation in Individual Families of Japanese Medaka, *Oryzias latipes. Mutation Research – Genetic Toxicology and Environmental Mutagenesis* 718: 18-23.
-W. Aaron. Shoults-Wilson, Brian C. Reinsch, Olga V. Tsyusko, Paul M. Bertsch, Greg V. Lowry, Jason M. Unrine. 2011. Toxicity of silver nanoparticles to the earthworm (*Eisenia fetida*): The role of particle size and soil type. *Soil Science Society of America Journal* 75: 365-377.
-W.A. Shoults-Wilson, Zhurbich, O, McNear, D, Tsyusko, O, Bertsch, P, Unrine, J. 2011. Evidence for avoidance of Ag nanoparticles by earthworms (*Eisenia fetida*). *Ecotoxicology* 20: 385-396.

Jason Unrine

Faculty Positions

Assistant Research Professor, Dep. of Plant and Soil Sciences, Univ. of Kentucky, 2008
Adjunct Assistant Professor, Dep. of Environmental Health Science, Univ. of Georgia, 2006
Position: 100% Research

Education

B.S. Antioch College, 1998, Biology
Ph.D. University of Georgia, 2004, Toxicology

Program Description

Environmental Toxicology is an interdisciplinary field concerned with understanding the harmful effects of biological, physical and chemical agents on living organisms. My research involves the environmental toxicology and chemistry of trace elements, including metal-based engineered nanomaterials. In particular, my focus has been on the development of high end analytical techniques for imaging and determination of chemical speciation of trace elements in biological and environmental samples. I apply these techniques to understand problems associated with pollution of the environment with trace elements through intentional or unintentional releases. I am interested in both human and ecological health and my research is playing a key role in determining how transformations and partitioning of trace-elements in the environment influence bioavailability and ultimately toxicity.
Much of my research aims to understand the fate, transport, bioavailability and effects of nanomaterials in the terrestrial environment. My group provided the first evidence for the bioavailability and trophic transfer of engineered nanomaterials in terrestrial systems, for which we have received international recognition. In addition to my focus on engineered nanomaterials, I am focused on several projects related to environmental health effects of trace-elements from traditional sources. Having a background in both human and environmental toxicology as well as environmental chemistry, I have been able to help develop and participate in interdisciplinary projects related to human environmental health issues such as lung and colorectal cancer.

International Service

Acting Chair, Nanotechnology Advisory Group, Society of Environmental Toxicology and Chemistry.
Advisory Board, NanoFATE, EU 7th Framework Project

Advisory Board, NanoTOES, EU 7th Framework Project

Graduate Student Advisor

Advised 3 MS students, 3 Postdoctoral Fellows

Current Research Support

Jason Unrine (PI), Olga Tsyusko, Ursula Graham, Allan Butterfield, Paul Bertsch. Environmental behavior and bioavailability of Ag and CeO_2 nanoparticles: the role of surface functionalization and its interaction with natural organic substances and iron oxohydroxides. U.S. EPA, $599,840. 2/1/2011-1/31/2015, (4 year grant), Nationally Competitive (~10% success rate).

Susanne Arnold (PI), … Jason Unrine (Co-I), et al., A population-based case-control study of lung cancer in Appalachian Kentucky: The role of environmental carcinogens. $1,058,613. U.S. Department of Defense. 10/1/11-9/30/13.

Richard Warner (PI), Jason Unrine (Co-I), Chris Barton, Carmen Agouridis. Appalachian Research Initiative for Environmental Sciences (ARIES). Subcontract from Virginia Polytechnic Institute and State University. Funded by a consortium of coal companies, Initial award $383,533 for year one with possibility of additional future funds. 7/1/11-6/30/16.

Paul Bertsch (PI), Jason Unrine (Co-I), Olga Tsyusko, Dave McNear, Nadine Kabengi, Greg Lowry, Mark Wiesner, Elizabeth Casman, Steve McGrath, Claus Svendson, David Spurgeon, Stephen Lofts, Andrew Neal, Bruce Jefferson, Sophie Rocks. The Transatlantic Initiative for Nanotechnology and the Environment (TINE), U.S EPA, United Kingdom National Environmental Research Council, $2,000,000, 7/1/2010-6/30/2014.

Paul Bertsch (PI) and Jason Unrine (Co-I). National Center for the Environmental Implications of Nanotechnology (CEINT). National Science Foundation. $550,000, 9/1/2009 – 8/30/2014, Nationally Competitive, Subcontract from Duke University.

Robert Yokel (PI), Jason Unrine (Co-I), et al., A device containing an immobilized chelator to remove aluminum from total parenteral nutrition solutions. National Institutes of Health, $760,557, subcontract from nationally competitive SBIR grant to Alkymos, Inc.

Refereed journal articles (selected of 16 for current year, 37 total for career)

*corresponding Author

Frank von der Kammer, P. Lee Ferguson, Patricia A. Holden, Armand Masion, Kim R. Rogers, Stephen J. Klaine, Albert A. Koelmans, Nina Horne, Jason M. Unrine*. Analysis of engineered nanomaterials in complex matrices (environment and biota): General considerations and conceptual case studies. *In Press. Environmental Toxicology and Chemistry.*

W. Aaron. Shoults-Wilson, Brian C. Reinsch, Olga V. Tsyusko, Paul M. Bertsch, Greg V. Lowry, Jason M. Unrine*. 2011. Toxicity of silver nanoparticles to the earthworm (*Eisenia fetida*): The role of particle size and soil type. *Soil Science Society of America Journal* 75: 365-377.

W.A. Shoults-Wilson, Zhurbich, O, McNear, D, Tsyusko, O, Bertsch, P, Unrine, J*. 2011. Evidence for avoidance of Ag nanoparticles by earthworms (*Eisenia fetida*). *Ecotoxicology* 20: 385-396.

CURRICULUM VITAE

David A. Van Sanford
Professor

Education

Ph.D., Genetics, 1981, North Carolina State University
M. S., Agronomy, 1978,Colorado State University
B. S., Agronomic Crop Science, 1973, Oregon State University

Employment

1993 to present: Professor of Agronomy, University of Kentucky
1987 to 1993: Associate Professor of Agronomy, University of Kentucky
Sep. 1990 - Feb. 1991: Visiting Associate Professor, Dep. of Agronomy, Kansas State University, Manhattan, KS (sabbatical leave)
1981-1987: Assistant Professor of Agronomy, University of Kentucky

Recent Extramural Funding

•*Soft Red Winter Wheat Breeding and Variety Development for Kentucky*. Funded by the Kentucky Small Grain Growers Association/Kentucky Small Grain Promotion Council, 1991 - present: $770,000.00
•*Accelerating the Development of Scab Resistant Wheat Varieties*. FY 1999 – present: Funded by US Wheat and Barley Scab Initiative/USDA. $ 1,215,000
•*Development of Soft White Winter Wheat for Kentucky*. Funded by the Kentucky Department of Agriculture, 1999-2000. $20,000.00
•*Breeding Value Added Soft Winter Wheat for Kentucky*. Funded by USDA-CSREES special New Crop Opportunities Grant, 2001-2009. $263,000
•*Improving barley and wheat germplasm for changing environments.* Dubcovsky et al., 2011-2016. Funded by USDA-NIFA-AFRI. $ 25 M. PI portion $ 251,934.

Teaching Experience

Graduate: PLS 676 - Quantitative Inheritance In Plant Populations
PLS 664 - Plant Breeding
IPS 625 – Transdisciplinary Research in Plant and Soil Science
PLS 697b "Correlated Traits And Indirect Selection"
Undergraduate: PLS 490 - Capstone course
PLS 412 - Grain Crops

Graduate Students

Ph.D. students advised or co - advised: 9
M.S. students advised or co - advised: 10

Cultivars and Germplasm Released

'Kenoat' winter oat; 'Schochoh' six row winter feed barley; 'Verne' soft red winter wheat 'Foster' soft red winter wheat ; 'Kristy' soft red winter wheat; KY 83C-16-2 wheat germplasm; 'KY 83C-16-2' soft red winter wheat; 'KY 91C-171-24 soft red winter wheat; 'Allegiance' soft red winter wheat; 'Declaration' soft red winter wheat;'Cumberland' soft red winter wheat ; 'Pembroke' soft red winter wheat

Recent Refereed Journal Articles

• Knott, Carrie A., D. A. Van Sanford and E. J. Souza. 2008. Comparison of selection methods for the development of white-seeded lines from red x white soft winter wheat crosses. Crop Sci. 48:1807-1816.
• Kumudini, S., L. Grabau, D. Van Sanford, and J. Omielan. 2008. Analysis of yield-formation processes under no-till and conventional tillage for soft red winter wheat in the South central region. Agronomy Journal 100: 1026-1032.
• Brown-Guedira, G., Carl Griffey, Fred Kolb, Anne McKendry, J. Paul Murphy, David Van Sanford. 2008. Breeding FHB-resistant soft winter wheat: progress and prospects. Cereal Research Communications 36, supplement b (proceedings of the 3rd intl. symposium on Fusarium head blight, Mesterhazy and Toth, eds.): 31-35.
• Knott, Carrie A., David A. Van Sanford, and Edward J. Souza. 2009. Genetic variation and the effectiveness of early-generation selection for soft winter wheat quality and gluten strength. Crop Sci. 49: 113-119.
•M. D. Hall,* D. Tucker, C. A. Griffey, S. Liu, C. Sneller, M. Guttieri, D. Van Sanford, J. Costa, D. Marshall, and G. L. Brown-Guedira. 2010. Registration of USG 3209/Jaypee Wheat Recombinant Inbred Line Mapping Population. J Plant Regis 4:195-204.
• Guedira, M., G. Brown-Guedira, D. Van Sanford, C. Sneller, E. Souza, D. Marshall. 2010. Distribution of Rht genes in winter wheat germplasm from the eastern and central United States. Crop Sci 50: 1811-1822.

• Kang, Jing Anthony Clark, David Van Sanford, Carl Griffey, Gina Brown-Guedira, Yanhong Dong, J. Paul Murphy and Jose Costa. 2011. Exotic Scab Resistance Quantitative Trait Loci Effects on Soft Red Winter Wheat. Crop Science 51: 924-933.
• Agostinelli, A.M., A. J. Clark, G. Brown-Guedira, and D. A. Van Sanford. 2011. Optimizing phenotypic and genotypic selection for Fusarium head blight resistance in wheat. Online in EUPHYTICA. DOI: 10.1007/s10681-011-0499-6.

Recent Honors and Awards

Awarded to Wheat Science Group (DVS, Co-Chair):
Extension Specialists Outstanding Project Award, 1998
Extension Specialists Outstanding Project Award, 2006
USDA-CSREES Partnership Award for Mission Integration, 2007
Friends of IPM "Pulling Together" Award, 2008
American Society of Agronomy Certificate of Excellence Award for "A Comprehensive Guide to Wheat Management in Kentucky", 2009
Fellow, American Society of Agronomy, 2011
Fellow, Crop Science Society of America, 2011

Service

• Chair, National Wheat Improvement Committee 2000-2005 Developed national legislative agenda for wheat research; led team of researchers and stakeholders to seek federal funding to support and enhance wheat research.
• US Wheat and Barley Scab Initiative (USWBSI)- Co-Chair and Director, Networking and Facilitation Office (NFO), 2007 to present: Responsible for all of the USWBSI's administrative and communication activities, including management of $5.05 M research grants program for USDA-ARS. The Director is also the Co-Chair of the USWBSI's Steering Committee and is the primary liaison between the USWBSI and USDA- ARS.

George J. Wagner

Faculty Positions

Assistant Scientist, Brookhaven Natl. Lab., 1977-1979
Associate Scientist, Brookhaven Natl. Lab., 1979-1983

Associate Professor, Dep. of Agronomy, Univ. of Kentucky, 1983-1987
Professor, Dep. Plant Soil Sciences, Univ. of Kentucky, 1987-present
Position: Plant Biochemist, 85% research, 15% teaching

Education

A.A.S. ECTI, New York, Electrical Tech.
B.A. SUNY, Buffalo, New York, Biology
M.A. SUNY, Buffalo, New York, Biology
Ph.D. SUNY, Buffalo, New York, Biology

Program Description

Research

My recent research has focused on two systems, both related to plant trichomes:
1) Studies on the metabolism and molecular manipulation of tall trichome secreted diterpenes and sugar esters of tobaccos.
2) Studies on the biochemistry and molecular manipulation of short trichome secreted phylloplanins (anti-fungal peptides) of tobacco and sunflower.

In both projects we have developed and applied biochemical tools to characterize the composition of secreted compounds and used molecular tools (RNAi-based gene knockdown and gene overexpression) to manipulate these.

In project 1 we have created novel mixtures of diterpenes and sugar esters using dsRNAi and amRNAi (collaboration with G. Tang). This has allowed preparation of large quantities of certain rare natural product biochemical for the study of their possible disease and insect resistance properties. In project 2 we have overexpressed a tobacco phylloplanin fusion gene in a blue mold sensitive tobacco type to create stable blue mold resistance (manuscript in preparation). Resistant plant lines will be tested in the field next year.

We have collaborated with D. Williams (Turf Science Program) to test the efficacy of tobacco phylloplanin in protecting turf grasses against 3 important diseases of turf, in the field. This past season was the third for testing two of these diseases (manuscript in preparation). We have also investigated the mechanism of action of tobacco and sunflower phylloplanins against spores of several fungi, in vitro (manuscript in preparation).

Teaching

I have continued to teach various subjects in the graduate-level PLS 622-623 series courses. In 2010 and before (and the spring of 2011) I taught plant cell biology, ion & solute transport, in 622 and light responses, signal transduction and plant stress in 623. These contributions accounted to 46% of 622 and 56% of 623. These courses were reorganized for the fall of 2011. I am teaching 30% of 622 this fall, and am scheduled to teach 23% of 623 next spring semester.

For many years I have contributed 7% of lectures (on plant respiration) in the graduate-level Plant Biochemistry course, PLS606.

In 2010 I initiated a 1 credit undergraduate-level course GEN300-004, Climate Change and Agriculture, because we had no instruction in the College on this important subject. There were ~20 students enrolled in 2010 and 2011. I taught 46% of this course in 2010 and 57% in 2011. This course will be continued in 2012 and possibly expanded thereafter. In 2011 I presented guest lectures on climate change in HON 211, GEN300, and AEC305.

Review Activities

I have served on grant review panels one or more times for: USDA-NRI (Plant Responses to the Environment), panel manager 2000, DOE, NSF, and EPA, and have reviewed manuscripts for various journals. Ad hoc grant reviewer for NRI, NSF, NRC, SBIR, BARD, NRC-Canada, Stanford Linear Accelerator Center Projects, occasional NIH.

Graduate Student Advising

Latest student - Brian King, PhD 2011, (total UK career 4MS, 7PhD, 14 postdoctorals).

Refereed Articles (career total 99)

Current year, King, B., Williams, D., Wagner, G.J. (2011) Phylloplanins prevent gray leaf spot and brown patch diseases on turf grasses. Crop Science 51: 2829-2839.

Current Research Support

A) Regionally Competitive - P.I. with Antoanetta Kroumova, co-PI: Kentucky Tobacco Research and Development Center, Lexington, KY (1/09-6/12) "Introduction of Tobacco Phylloplanins to Provide Endogenous, Broad-Spectrum Fungal Resistance to

Plants." $131,572 – extended to 6/12.

B) Regionally Competitive – P.I., with co-P.I. Paul Bertsch, co-P.I.: Kentucky Tobacco Research and Development Center, Lexington, KY (2/10-6/12) “Studies of Nanoparticle Accumulation in Tobacco Plants and Plant Cells Toward Exploiting Plants for Producing Novel Green-Nanoparticles and Pollutant-Decontaminating Biosensor Plants”. $30,000 – extended to 6/12

C) Nationally Competitive – P.I. NASA KY Space Grant Consortium (2012) “Simple, Hands-On, Experiment-Based Climate Change Science Instruction for Middle and High School Science Teachers”. $10,000.

Patents

Trichome Specific Regulatory Sequence – G. Wagner, E. Wang, R. Wang, S. Gan, US Patent 6,730,826, 5/04

Calcium Exchange Expression in Plants – K. Hirschi, G. Wagner, V. Korenkov, provisional

Wagner, G.J., Shepherd, R. W. Utility of phylloplanins as antibiotics, selective fungicides, and for enhancing microbial resistance. US Patent 7,501557B1, 3/09, UK Case 1235

Wagner, G.J., Shepherd, R. W. A novel approach for delivering proteins and protein products to plant aerial surfaces. United States Provisional Patent #60/777,383, UK Case 1260

Wagner, G.J., King, B., Shepherd, R.W. The utility of phylloplanins to preserve organic products (initiated 5/08, UK Case 1527).

Ole Wendroth

PROFESSIONAL CAREER

Since 2004 Associate Professor, University of Kentucky, Department of Plant and Soil Sciences
1992-2004 Research Scientist at Center of Agricultural Landscape and Land Use Research, Muencheberg, Germany
1991-1992 Post-Graduate Research Scientist, Department of Land, Air and Water Resources, University of California, Davis
1990-1991 Scholarship of German Academic Exchange Service (DAAD), Post Graduate Researcher, Department of Land, Air and water Resources, University of California, Davis, Mentor: Donald R. Nielsen
1987-1990 Graduate Student Assistantship at Georg-August-University of Goettingen, Germany, Institute of Agronomy and Plant Breeding, Advisor: Wilfried Ehlers

EDUCATION

2001 Habilitation (*venia legendi*), Technical University of Berlin, Germany
1990 PhD (Dr. sc. agr.), University of Goettingen, Germany
1987 Diploma Degree in Agricultural Sciences/Agronomy and Soil Science, Germany
1982 Practical Farming Degree after two-year-apprenticeship, Germany

PROGRAM DESCRIPTION

Research
In my research work, I have been tackling fundamental concepts of soil physics, applying them with measurements across spatial and temporal domains of landscapes and quantitatively analyzing those data with other soil attributes to understand the impact of their spatial and temporal relationships with attributes of plant growth. I have been working on the enhancement of scientific knowledge in soil physics, soil landscape research, and experimental design while simultaneously helping farmers to understand the field situation and better manage their own fields. The projects established in our group have been focused on

i) soil physical properties across the landscape, their impact on plant growth, and how to monitor crop status at different times during the growing season to apply fertilizer nitrogen site-specifically and not necessarily uniformly,
ii) methods for sampling solute leaching at the field scale in a spatially representative fashion,
iii) field-scale bromide leaching affected by rainfall intensity, amount and application time delay,

iv) soil tillage and kinetic rainfall energy effects on interrill soil erosion and runoff sediment composition,
v) soil water, carbon, and nitrogen dynamics in established land use systems under pasture and crop management, and the effect of land use change on these dynamics, and
vi) soil water transport at different scales; co-regionalization of soil hydraulic properties and their description across different scales.

Teaching
Since 2004, I have been teaching graduate courses in Soil Physics and Soil Physics Laboratory (PLS 575 and 576) for five times. In 2006 and 2008, I taught a new graduate level course in Spatial and Temporal Statistics (PLS 597, Special Topics). Meanwhile, this course has been approved by the University Committees as a regular course PLS 655 and regularly taught in 2010. With this course, I contribute to the establishment of new experimental designs and diagnostic tools, especially relevant in agro- and environmental ecosystem research and education.

PROFESSIONAL RECOGNITION

2012 Guestprofessorship at the University of Natural Resources and Life Sciences, Vienna, Austria
2011 Invited Oral Keynote Speaker at the BRAZILIAN SOIL PHYSICS MEETING, University of São Paulo ESALQ, Piracicaba – SP, Brazil
2009: Fellow of the Soil Science Society of America
2008: Fellow of the American Society of Agronomy
2007: The 2006 Outstanding Associate Editor Award for the Journal of Environmental Quality

INTERNATIONAL AND NATIONAL SERVICE

2011 Outside PhD Dissertation examiner for the Universities of Sydney and Vienna
2011 Workshop on Spatial and Temporal Statistics in Soil Physics. Czech University of Life Sciences.
2010 Core group member of four scientists who compiled a letter to the NIFA Director in response to the AFRI RFP in which Soil Process Research was not anymore considered as a national challenge area.
2010 Chair of the Don & Betty Kirkham Soil Physics Award Committee, SSSA.

Reviewer and Associate Editor and other activities

GRADUATE STUDENT ADVISOR

Advised 1 MS and 5 PhD students

CURRENT RESEARCH SUPPORT

- Ole Wendroth (PI), Mark S. Coyne, Rebecca L. McCulley, Anastasios D. Karathanasis, John H. Grove; **Dynamics of Soil State Variables and Related Processes Across a Land Use Gradient in Spatial and Temporal Transition**, USDA-NRI,2008-2012; $324,255
- Ole Wendroth (PI), Greg Schwab (Co-PI), Lloyd Murdock (Co-PI), Dennis Egli (Co-PI); **Farm Test of Crop Sensing for Site-Specific Nitrogen Fertilizer Application in Winter Wheat;** Kentucky Small Grain Promotion Council; $6,500
- Ole Wendroth, **Soil water quality and relevant transport processes at different spatial and temporal scales;** SB 271 Water Quality Program, College of Agriculture; $33,000 (2011/12)

REFEREED PUBLICATIONS (current year: 5, total: 84, two most recent:)

Wendroth, O., V. Vasquez, and C.J. Matocha. 2011. Field experimental approach to bromide leaching as affected by scale-specific rainfall characteristics. *Water Resour. Res.* doi: 10.1029/2011WR010650, in press.

Wendroth*, O., S. Koszinski, and V. Vasquez. 2011. Soil spatial variability. p. 10-1-10-22. In: Huang, P.M., Y.C. Li, and M.E. Sumner (Eds.) Handbook of Soil Science, 2nd ed., CRC Press. (in press).

D.W. Williams

Faculty Positions

Assistant Professor, Dep. of Agronomy, Univ. of Kentucky, 1997
Associate Professor, Dep. of Plant and Soil Sciences, Univ. of Kentucky, 2003-present
Position: Turfgrass science research/teaching, 60% research, 30% teaching, 10% director undergraduate studies

Education

B.S. Eastern Kentucky University, 1981, Technical Horticulture/Turfgrass Science
M.S. University of Kentucky, 1993, Crop Science/Turfgrass Science
Ph.D. University of Kentucky, 1996, Crop Science/Turfgrass Science

Program Description

Research
Current research activities include an array of studies that provide much needed information to turfgrass managers and others in Kentucky and beyond. Some projects are funded by non-competitive grants. Examples include the National Turfgrass Evaluation Program (NTEP), pesticide efficacy trials, fertilization studies, and cooperative work with the UK departments of Plant Pathology and Entomology. NTEP trials are sponsored by the USDA and National Turfgrass Federation. These are variety evaluation trials that contribute to a national database. More importantly, they provide knowledge of how cultivars perform in Kentucky. Four cool-season grass trials and one warm-season grass trial are in progress at this time. Pesticide efficacy and fertilizer trials are sponsored by industry representatives. They vary a
great deal from year to year in number, size and complexity. There are also several ongoing projects funded by industry representatives or by nationally competitive sources that are contributing to my research goals. One example is work with Seeds West, Inc. that is contributing a great deal in improving cold tolerance of seeded bermudagrasses. We anticipate a new, similar germplasm screening project funded by a new source to be established in 2012. Another example is three separate evaluations of feedstocks as biofuels funded by the US DOE, the Energy Biosciences Institute, and Ceres, Inc. I will continue to engage in both applied and basic research activities. I am particularly interested in researching topics in integrated pest management (IPM) and best management practices (BMP). Concerning IPM, I would like to continue work on controlling fungal turf

diseases with cultural practices and plant-generated compounds. I am also conducting studies investigating BMPs for high-use athletic fields. My goals with this work are two-fold. First, to maximize athlete safety using natural turf instead of artificial turf, and secondly to reduce management inputs through species/cultivar selection and turfgrass culture.

Teaching/Administrative
My recent teaching/administrative efforts focused on developing and instituting the HPLS programmatic assessment protocol. Much work still remains to be done in this program.

Professional Recognition

Ken Freedman Outstanding Faculty Advisor Award, University of Kentucky, 2011

National Service

2010- Immediate past chair, Division C-5 Turfgrass Science, Crop Science Society of America.
2009-2010-Member, National Research Committee of the Golf Course Superintendents Association of America.
2009- Chair, Division C-5 Turfgrass Science, Crop Science Society of Americ.a
2008- Chair-elect, Division C-5 Turfgrass Science, Crop Science Society of America.
2006-Chair, National Turfgrass Evaluation Program (NTEP) Policy Committee (same as the Board of Directors).

Graduate Student Advisor

Advised 6 MS and 5 PhD students

Current Research Support

- Sole P.I.: Regional Biomass Feedstock Partnership - Herbaceous Bioenergy Crop Field Trials. Effects of Nitrogen Fertility on *Miscanthus* x *gigantus* hybrids for biofuel production. U.S. DOE SUN Grant (nationally competitive). $63,000
- Sole P.I. Evaluation of Switchgrass and *Miscanthus* x *gigantus* hybrids as biolfuel feedstocks.
Funded by the University of Illinois. $60,000.
-Sole P.I. Evaluation of several species as biofuel feedstocks. Ceres, Inc. $63,000.
-Co-P.I. with Dr. Michael Barrett of pesticide efficacy and cultivar evaluation trials funded (non-competitively) by various

industry corporations. Duration: Generally one to five years. 1997-present. Annual average support $60-$100K

Refereed journal articles (current year, plus 18 additional for career)

- Vincelli, P., Williams, D., and Dixon, E. 2011. Early curative fungicide applications provide disease control on fairway-height creeping bentgrass. Online. Applied Turfgrass Science. doi:10.1094/ATS-2011-1025-01-RS.
-Brian King, D. W. Williams and G. J. Wagner. 2011. Phylloplanins Reduce the Severity of Gray Leaf Spot and Brown Patch Diseases on Turfgrasses. Crop Science. 51: 6: 2829-2839; doi:10.2135/cropsci2010.12.0727.
-Maughan, M., G. Bollero, D.K. Lee, R. Darmody, S. Bonos, L. Cortese, J. Murphy, R. Gaussoin, M. Sousek, D. Williams, L. Williams, F. Miguez, and T. Voigt. 2011. Miscanthus x giganteus productivity: The effects of management in different environments. Global Change Biology–Bioenergy. (in press).

Extension publications

-PPA-1. Chemical Control of Turfgrass Diseases 2011. Paul Vincelli, Extension Professor, Plant Pathology, and David W. Williams, Associate Professor, Plant and Soil Sciences.
-ID-154. Low-Maintenance Lawn Care, Stressing Pest Avoidance and Organic Inputs. Paul Vincelli, David Williams, A. J. Powell, and Dan Potter.
-PPFS-OR-T-10. Sudden Deterioration of New Creeping Bentgrass Putting Greens. Paul Vincelli, Extension Plant Pathologist and David Williams, Turfgrass Agronomist.

William W. Witt Date: December, 2010
Professor
Position. Weed Scientist. 25% Research, 25% Teaching, 50% Extension.
Education.
B. S., Agronomy, Oklahoma State University, 1969.
M.S., Agronomy (Weed Science), Oklahoma State University, 1971.
Ph.D., Crop Science (Weed Science), North Carolina State University, 1974
Program Description

Research.
My research program emphasizes the development of weed management strategies in beef and horse pastures and in non-crop sites. My focus in 2009-2010 was to develop control tactics for weeds in beef and horse pastures that inhibit grazing with an emphasis on tall ironweed, spiny pigweed, and woody plants such as multiflora rose and blackberries. A cooperative project with Glen Aiken on improving the forage quality of tall fescue by using certain herbicides was conducted in 2009 and 2010. Pedro Moraes, a post-doc in my program has focused on the relative competitiveness of nimblewill with Ky 31 tall fescue compared to two new tall fescues, with or without a novel endophyte, developed by Tim Phillips. We have shown that these new tall fescues are more competitive with nimblewill and the presence of an endophyte in tall fescue has little impact on relative competitiveness. The primary effort for my Kentucky Transportation project was to hire a new person to conduct research for this project, and this was accomplished in May, 2010. Not having a full time person for over a year reduced productive results for this project. However, during the last six months of 2010 Joe Omielan began numerous experiments on especially problematic weeds along highway rights-of-way described by Kentucky Transportation Cabinet personnel.

Teaching.
I teach PSL 404, Integrated Weed Management (a required course for Horticulture, Plant & Soil Science, and Sustainable Agriculture students), PLS 490 (is the Capstone course and I teach the group interested in aspects of agronomic crop production) and PLS 697, Herbicide Chemistry(graduate students).

Extension.
I am the only weed scientist participating in the Pasture and Forage Working Group of the Equine Initiative. In order to reach a larger number of people, I write a monthly article for

the *Bluegrass Equine Digest* where I highlight a weed that commonly occurs in horse pastures. This has been a huge success and the Weed of the Month routinely receives the most page views each month. Similarly, I cooperated with *The Horse* to produce two short videos on "Plants Poisonous to Horses" and "Controlling Thistles in Horse Pastures." The poisonous plant video is the most successful (in terms of page views) of any video they have produced. I work closely with the Kentucky Transportation Cabinet in providing information regarding highway weed and herbicide management. I also assist in providing training programs on various weed/herbicide issues for Transportation Cabinet employees each year. I serve as Chair of the Advisory Board for the Vegetation Management Association of Kentucky. I maintain a web site specifically for non-crop and invasive species control. I am on the Board of Directors of the National Roadside Vegetation Management Association whose goal is to provide the most current techniques and technologies for roadside weed management.

Professional Recognition and Service:

Fellow, 1997. Weed Science Society of America.
Outstanding Teaching Award. 1994. Weed Science Society of America.
Distinguished Achievement Award in Education. 1992. North Central Weed Science Soc.
Outstanding Educator Award, Southern Weed Science Society. 2009.
George Mitchell Award for Service to Graduate Education, Gamma Sigma Delta, 2002. UK.
Roadside Excellence Award, National Roadside Vegetation Mgt. Assn., 2005, 2011.

Graduate Student Advising

M. S. Currently, 2. Career, 24.
Ph. D. Currently, 2 (co-advising). Career 21.

National Service. Review Panels

The National Academies, Transportation Research Board, National Cooperative Highway Research Program. Synthesis Project 394, 2009. Reducing Litter on Roadsides.
Extension Integrated Pest Management Coordination and Support (EIPM-CS) Program. CSREES Review of proposals submitted by all states. January, 2009.

Current Research Support

Integrated Weed Management Strategies to Increase Pasture Productivity. 2008-2011. USDA-CSREES Regional Integrated Pest Management Grants Program-Southern Region. $116,188.

Co-PI with J. D. Green (PI), K. H. Burdine (Co-PI), and G. J. Schwab (Co-PI). Southern Region competitive.

Managing Weeds That Inhibit Beef and Horse Grazing. 2007-2012. USDA-ARS Specific Cooperative Agreement. $67,020. PI.

Management of Troublesome Weeds in Highway Rights-of-Way. 2011-13. Kentucky Transportation Cabinet. $233,464. PI.

Publications.

Refereed Journals:

Aiken, G. E., B.M. Goff, W. W. Witt, I. A. Kagan, B. B. Sleugh, P. L. Burch, and F. N. Schrick. 2011. Steer and Plant Responses to Chemical Suppression of Seedhead Emergence in Toxic Endophyte-Infected Tall Fescue. Crop Science. In Press.

Goff, B.M., G.E. Aiken, W.W. Witt, B.B. Sleugh, and P. L. Burch.2011. Steer Consumption and Ergovaline Recovery from In Vitro Digested Residues of Tall Fescue Seedheads. Crop Sci. In Press.

Tolson, J. A., J. D. Green, William W. Witt, Greg J. Schwab, and Joseph A. Omielan. Integrated management strategies reduced tall ironweed (Vernonia altissima) populations and weed biomass and improved tall fescue pasture productivity. 2011. Weed Science. In press.

Norsworthy, J.K., S. Ward, D. Shaw, R. Llewellyn, R. Nichols, T. Webster, K. Bradley, G. Frisvold, S. Powles, N. Burgos, W. Witt, and M. Barrett. 2011. Reducing the risks of herbicide resistance: best management practices and recommendations. Weed Science. In press.

Extension.

ID-147. Establishing Horse Pastures. Ray Smith, Garry Lacefield, Laura Schwer, and William Witt, Plant and Soil Sciences; Robert Coleman and Laurie Lawrence, Animal and Food Sciences. 2010.

Hongyan Zhu

Faculty Positions

Assistant Professor, Department of Plant and Soil Sciences, University of Kentucky, 2004
Associate Professor, Department of Plant and Soil Sciences, University of Kentucky, 2009
Position: Plant genetics and genomics, 85% research, 15% teaching

Education

Ph.D., Genetics, Texas A&M University, 2001
M.S., Genetics, Kansas State University, 1997
M.S., Statistics and Quantitative Genetics, Yangzhou University, China, 1991
B.S., Agronomy, Yangzhou University, China, 1988

Program Description
My research interests focus on: 1) the use of comparative genomics tools to understand the evolution of structure and function of plant genomes, 2) the integration of comparative structural genomics with comparative plant biology, and 3) the translation of information gained from model systems into the genetic improvement of economically important crops. Current research focuses on two extremes of plant-microbe interactions: Defense and Symbiosis. Both research themes involve „translational" research from model to crop species. For plant disease resistance, our long-term goal is to use the model legume *Medicago truncatula* as a surrogate to clone and characterize disease resistance genes against alfalfa pathogens, with the ultimate goal to develop alfalfa cultivars with genetically improved disease resistance. For symbiosis, we are using rice as a model system to characterize the function of non-legume counterparts of legume genes that are required for root symbioses, with the ultimate goal to understand the evolution of root symbioses in plants. We are also studying the molecular mechanisms underlying symbiosis specificity in the legume-rhizobial mutualism.
Teaching: I teach PLS597-001: Plant Genomics. This course is designed for graduate students who are interested in recent discoveries and emerging technologies in plant genomics research. The course consists of approximately 40 hours of lectures which cover structural genomics, functional genomics, comparative genomics, translational genomics, and the basics of bioinformatics.

Representative Publications

Wang D, Yang S, Tang F, **Zhu** H (2012) Symbiosis specificity in the legume-rhizobial mutualism. *Cellular Microbiology* (in press)
Yang S, Tang F, Gao M, Krishnan H, **Zhu H** (2010) *R* gene-controlled host specificity in the legume-rhizobia symbiosis. *Proceedings of the National Academy of Science USA*, 107: 18735-18740

Chen C, Fan C, Gao M, **Zhu H (2009)** Antiquity and function of *CASTOR* and *POLLUX*, the twin ion channel-encoding genes key to the evolution of root symbioses in plants. *Plant Physiology* 149:306-317
2 Yang S, Gao M, Xu C, Gao J, Deshpande S, Lin S, Roe B, **Zhu H** (2008) Alfalfa benefits from *Medicago truncatula*: The *RCT1* gene from *M. truncatula* confers broad-spectrum resistance to anthracnose in alfalfa. *Proceedings of the National Academy of Science USA*, 105: 12164-12169
Chen C, Ané J-M, **Zhu H** (2008) Os-IPD3, an ortholog of the *Medicago truncatula* DMI3 interacting protein IPD3, is required for mycorrhizal symbiosis in rice. *New Phytologist* 180: 311-315
Chen C, Gao M, Liu J, **Zhu H (**2007) Fungal symbiosis in rice requires an ortholog of a legume common symbiosis gene encoding a Ca^{2+}/calmodulin-dependent protein kinase. *Plant Physiology* 145:1619-1628
Zhu H, Riely B, Burns NJ, Ané JM (2006) Tracing non-legume orthologs of legume genes required for nodulation and arbuscular mycorrhizal symbioses. *Genetics* 172:2491-2499
Zhu H, Choi HK, Cook DR, Shoemaker RC (2005) Bridging model and crop legumes through comparative genomics. *Plant Physiology* 137:1189-1196

Synergistic Activities

Member of the International Scientific Advisory Board, Model Legume Congress 2011, France
Reviewer of Chinese 973 program, 2010
Panel member, USDA-DOE Plant Feedstocks Genomics for Bioenergy program, 2010
Panel member, NSF East Asia and Pacific Summer Institutes for US Graduate Students (EAPAI) program, 2009-2010
Panel member, NSF Symbiosis, Defense and Self-recognition Program, 2007
Member, Hatch Proposal Review Committee, Department of Plant Sciences, UK, 2005-2008
Co-organizer, the symposium “Through the looking glass of molecular and cellular genetics of plants: strategies to translate basic crop research into practical solutions.” Lexington, KY, September 21, 2007

Professional Recognition

Prestigious research publication award, College of Agriculture, University of Kentucky, 2010

Current Research Support

Hongyan Zhu (PI), 2007-2011, Function of non-legume orthologs of legume genes required for nodulation and arbuscular symbioses, National Science Foundation (NSF), $480,000
Hongyan Zhu (PI), 2009-2011, Defense versus symbiosis: Host genetic control of nodulation specificity in soybean, USDA-AFRI Competitive Grants Program, $150,000

Graduate Students Advised: 2 PhDs and 1MS

Postdocs Advised: 4

Visiting Scholars Hosted: 3

Graduate Student Committees: 5

External Review Report

Department of Plant and Soil Sciences Periodic Review (March 28 & 29, 2012)

Final Report

I. Review Process

Consistent with the University of Kentucky's Administrative Regulations, Dean M. Scott Smith, Dean of the College of Agriculture, appointed and charged a Periodic Review Committee to conduct an evaluation of the Department of Plant and Soil Sciences (PSS).

Members of the review committee were: Dr. Gary E. Bates (University of Tennessee), Dr. Kent J. Bradford (UC Davis), Ms. Jeanne M. Hartman (Plant and Soil Sciences), Dr. James R. Martin (Plant and Soil Sciences), Dr. Rebecca L. McCulley (Plant and Soil Sciences), Mr. Daniel L. Starnes (Plant and Soil Sciences), Dr. Lisa J. Vaillancourt (Plant Pathology), Dr. Bruce A. Webb (Entomology), and Dr. John J. Obrycki, Chair (Entomology).

Committee members received the PSS self-study document on January 4, 2012. The committee met with Dr. M. Scott Smith, Dean of the College of Agriculture (COA) on January 19, 2012 to discuss the review process. The two external members participated in the meeting via a teleconference link. During this meeting, (COA) Assistant Dean Dr. Lisa Collins provided an overview of the review process. Dean Smith made the following points: (1) PSS has the widest scope of research, extension, and teaching programs in the College of Agriculture – can the current faculty maintain the scope of work? (2) Has the integration of Extension and Applied Research programs within a single faculty member's position worked? (3) How does the PSS Department function within several multidisciplinary undergraduate programs? (4) How is the new structure for the graduate program (Integrated Plant and Soil Sciences) working? (5) What are the future staffing plans for Princeton and Robinson? What areas can be reduced? (6) What is the Dept of PSS known for? What are the areas of emphasis in PSS?

Due to a scheduling conflict the committee met with Dr. Nancy Cox, Associate Dean for Research in the College of Agriculture on March 14, 2012. All other meetings with faculty, staff, students, post-docs and administrators took place on March 28 and 29, 2012. The committee provided an overview of its findings to Dr. M. Scott Smith, Dean of the College of Agriculture on March 29, 2012.

II. Findings from External review committee

Committee members were appreciative of the well-written self-study document and the frank and open discussions with members of the Department of Plant and Soil Sciences. Members of the Department were generally very pleased with the leadership provided by the Department Chair. Overall the department appears to be functioning well, has successful research, extension and teaching programs, and is largely fulfilling its mission. The review committee's comments are therefore addressed primarily to future challenges and areas that could be improved.

Major Challenges for the PSS Department

A critical issue facing the Department of Plant and Soil Sciences is how to manage the future directions of the department given the likelihood of further reductions in funding available for faculty lines. Alternatively, by maintaining faculty numbers, disciplinary breadth and clientele services may require reductions in support staff currently provided to faculty. It is not the review committee's mandate to recommend the direction that the department should take. However, we conclude from our discussions and reading of the self-study document that the department currently does not have an effective mechanism or culture in place in which to discuss, debate, evaluate and reach decisions on such issues. The current mechanism of an advisory committee representing the different sections of the department (i.e., crop science, plant biology and soil science) appears adequate to deal with input regarding prioritization of released faculty positions or other shorter term issues. But the review committee concluded that there does not appear to be a strategy or mechanism for department-wide visioning and strategic planning to make

decisions on the overall scope of departmental activities, for example, whether to reduce the scope of activities to achieve excellence in some subset of disciplines.

Achieving consensus on such overarching issues will require discussion and interaction among the sections of the department; at present these interactions appear to be rather limited. While there are individual faculty members whose programs and interests span these sections, the overall impression is of a department that is largely subdivided by its major disciplinary sections (crop science, soil science, and plant biology) coexisting under a common administrative structure. While this may function well when resources are not limiting, it may hinder developing a common vision for prioritizing directions when resources become more limiting.

One possible strategy for dealing with reduced faculty numbers could be to hire faculty, who through expertise and interests will bridge current disciplinary thrusts with a goal of increasing integration and inter-disciplinary activities. Identifying such opportunities likely requires broad internal discussions to recognize where such synergies might exist. If reductions are required, broad overviews of the relative needs and strengths of the department will be needed to identify the areas to reduce versus those to invest in. Similarly, decisions on whether to convert funds currently used for staff support into faculty lines or to maintain support resources at the expense of faculty numbers will require examination of long- term consequences of these options in relation to the department's mission and goals.

We recommend that to address these issues, and to achieve greater cohesiveness and shared purpose, the department should develop a strategic planning process that would foster engagement with these larger, longer-term issues to have guidelines for making the more immediate decisions on where to invest departmental resources. This process would require strong faculty leadership to outline the needs and objectives, commitment from faculty to engage in the process, and continuation of the discussions until consensus is achieved. We strongly encourage younger faculty (Assistant and Associate Professors) to become actively engaged in this process, and we suggest that they could actually be encouraged to lead this process. The objective should not be to produce an administrative document, but rather to break down the disciplinary

perspectives within the department to achieve a common vision for the future of the entire department. Such a specific, guided process is required to induce faculty to disengage from the immediacy of their usual duties and direct focused thought and energy to envisioning the future they would like to see for the department and how to collectively achieve it with the resources available.

Staff

The morale among departmental staff is very good; they are very appreciative of staff retention and the College of Agriculture Dean's effort to retain jobs and equity given the current budget situation. The on-campus staff does not feel understaffed, although Princeton could use more field and technical support. Several staff members expressed an opinion that there is not a lot of communication with faculty beyond departmental social events. The opportunity exists, but the feeling among some staff is that faculty members don't often participate in these opportunities. Staff members feel that they work well together and have an efficient flow of duties and tasks within the Department. Concerns were expressed regarding within Department cooperation at the North Farm.

Recommendations:

- Develop a written departmental policy on professional development for staff, including guidelines for their participation in further education and for recognizing the contributions of technical staff to patents and publications.
- Since administrative staff are scattered among several locations, it would be valuable to hold administrative staff meetings on a regular basis. (Suggested frequency = monthly).

Research

As outlined in the self-study document, the department encompasses a wide diversity of research thrusts, and in at least some of these areas, there is a history of successful collaboration between basic and applied research efforts. There are many recognized areas of research strengths in the Department of PSS; however, there appears to be a lack of coordinated, strategic thinking/planning within and across research groups (plant biology, soil science, crop science). Given the likelihood that faculty lines will

continue to decrease and any future hiring will, by necessity, need to be targeted, well-reasoned, compelling, and strategic, the Department would benefit from developing a list of current research strengths and identifying whether and how these strengths can be improved upon in the near future. Future faculty positions might focus on research priorities that reflect likely future funding opportunities and/or other synergies that develop within the department, college, and university. Younger faculty should be fully included in this process to identify current and future research strengths. The Department needs to develop a coordinated strategic research plan that identifies strengths historically, currently, and those likely to grow or continue to be sustainable into the future (from a funding perspective). Priorities for strategic hires in these areas should be made. While the team recognizes that the current process of deciding faculty line hires does some of this, the effort does not appear to be as clearly linked to strategic goals and research strengths of the department as a whole, as it could be.

The proposal of a shared, within the College of Agriculture, MS or PhD level person to help coordinate large grant submissions and build synergistic efforts was viewed as having potential to help accomplish some of these goals. However, such a position should not replace or substitute for a significant, within Department, effort to identify clear areas of research strength, ways to complement/build on these strengths, and the generation of a list of priorities along these lines.

Extension

A comprehensive survey, summarized in the self-study document, of County Agriculture and Horticulture Extension agents, commodity groups / government agencies, and private industry, indicates a high level of satisfaction of PSS extension programs among these clientele groups. However, the current level of Extension faculty effort within the Department is facing an imminent crisis as a result of retirements, recent appointments to administration, and an unexpected transfer to private industry. The fact that most Extension faculty in PSS have split appointments with research and additional faculty are taking on teaching responsibilities adds to the dilemma “How does Extension function in the future as the College of Agriculture downsizes?” This question was a common theme throughout the review; downsizing will impact extension programs and

research and teaching within the PSS Department. County extension agents expressed strong support for the extension programs in PSS. Several expressed concerns regarding the loss of PSS extension expertise at Robinson due to an administrative appointment for the current Extension Specialist at Robinson.

The review committee recommends that the department, as a whole, address this issue in a sincere dialogue about the long-range strategy concerning the future of Extension. The College of Agriculture administration must also play a role in helping develop a long-term vision that impacts not only the PSS Department, but also the entire College of Agriculture.

The review committee suggests that the following issues need to be addressed in this process:

a) The two specialists versus one specialist model to address extension needs within Kentucky. There are currently two faculty members on post-retirement appointments and another who will enter a post-retirement appointment in July 2012. These three faculty members are located at Princeton.

b) Teaching: How much teaching is expected from Extension faculty? Which faculty will be expected to teach the crop production classes for graduate and undergraduate students? Will new faculty at Princeton be expected to teach? If so, what technological upgrades are needed at Princeton? What are the expectations for Extension faculty to participate in the mentoring of graduate students?

c) Research: Split appointments involving extension and applied research have been successful in helping support the overall extension program. A split appointment of 80 % extension and 20 % research seems to be an appropriate split for many extension faculty members.

3) Multi-departmental groups such as the Wheat Science Group and the Equine initiative are good models to follow for future team efforts that will encompass both extension and research personnel.

Undergraduate education

Investment in multi-disciplinary programs at the undergraduate levels has proven effective for the PSS Department and is to be commended and supported. It is the

opinion of the review committee that the department should continue and consider expansion of this commitment. The HPLS (Horticulture, Plant and Soil Science) undergraduate degree program has experienced declining enrollment over the last decade. During discussions with the review committee, concerns were expressed about the name and identity of the HPLS program, for example, how does HPLS differ from SAG (Sustainable Agriculture). The consolidation of the undergraduate degree programs offers an opportunity to re-focus recruitment efforts and bring this area (HPLS) back to the point that it can be a competitive program. Alternatively, the department may consider tracking students currently in the HPLS degree program into one of the existing multi-disciplinary programs, as an area of concentration. This approach could also impact teaching assignments and courses offered. The department may consider an investment in additional marketing and enhanced visibility of the HPLS degree program to attract additional students.

The department has suggested that the HPLS degree may be strengthened by addition of a staff member charged with improving recruitment efforts. There were also discussions in several groups regarding the contributions of extension faculty to teaching in the more applied courses. The review committee feels that there may be opportunity for innovative combinations of teaching and recruitment responsibilities to enhance undergraduate education. Developing mechanisms for encouraging and rewarding faculty participation in undergraduate education may improve faculty participation in this increasingly important area. Team teaching among faculty in the department could also be encouraged.

Graduate Education

The review committee views the new IPSS graduate program as a major step to integrate graduate education and research within the Department. This new integrated graduate program was considered a very positive step forward by the review committee. The review committee suggests that the department consider the development of additional integrated graduate level courses to support the IPSS program. This new IPSS graduate program faces several challenges to integrate advising and mentoring of graduate students within a common integrated program. The management of the IPSS

program will require that all DGS are giving the same information, and it might require that one program DGS serve as the final authority. The review committee suggests that all information about the IPSS program should be easily available on-line or via email. The review committee suggests that the IPSS model could be used effectively by the department to better integrate the departmental research enterprise.

Recommendations:

a) Develop research clusters focused on strengths and informally or formerly designate these clusters as research foci that can be used to recruit graduate students. Possible examples include: Natural products, Crop production, Biofuels, Wheat Science, and Seed Biology. These research clusters should cross all three disciplinary boundaries. Preferably most faculty members will be involved in more than one of these areas. These faculty members could serve as advisors/committee member resources for students.
b) Consolidate the various departmental seminars. The review committee recommends that that department consider developing one department-wide seminar that would focus on the integration of areas within the Department. Suggested approaches to schedule student seminars which are an important component of the current departmental seminar structure include: scheduling groups of student presentations (2-3 /day), eliminate one required student seminar, e.g. proposal seminar, establish an IPSS mini-meeting for all graduate students enrolled -- five talks over 1-2 days in all areas, and the exit seminar for graduate students could be scheduled separately.

Based on the graduate students (GS) meeting, it is clear that there are a few key points that the GS wish to have addressed in the process of reviewing the department. First, the GS feel that there is little that connects them beyond being enrolled in the same program. This can be primarily attributed to the lack of an active graduate student association (GSA) within the Department of PSS. Revitalization of the GSA will allow the GS a forum for ideas and potentially could generate new ideas for integration within the department. Another point that the GS stressed was the lack of involvement of the

GS in departmental governance. The GS would like to have representatives at departmental functions such as faculty meetings, appropriate departmental committees, and faculty search committees. Overall, a sense of underutilization is felt amongst the GS. This is likely linked to the lack of an active GSA. An additional issue is that the GS do not feel that they are adequately prepared to function as graduate students within the department. Simple things like the requirements for seminars (both attendance and participation as a presenter) and travel to professional meetings are not addressed in a clear and concise way. Overall, the feeling is that there is a lack of quality information to enable the GS to be prepared to meet the requirements, both written and unspoken, of the department. These major concerns can be boiled down to a lack of GS involvement, additional communication from the faculty directly involved in the management of the graduate program, and cohesion amongst the GS. The GS did express that the one-on-one communication between faculty and GS is exemplary and is of tremendous benefit to the GS education and scientific development.

III. Summary of Review Committee Recommendations

1. The department should develop a strategic planning process that would foster engagement with larger, longer-term issues in order to have guidelines for making the more immediate decisions on where to invest their resources.

2. The entire Department needs to discuss and resolve several major issues facing the Department. The College of Agriculture and the Department of PSS are getting smaller – what areas and/or responsibilities will be given up? Examples of the long-range type of issues that need to be discussed include the undergraduate HPLS curriculum, research foci within the Department given reduced number of faculty, extension foci – given reduction in Extension FTEs. The review committee suggests that the new IPSS graduate program might serve as a mechanism to integrate the various sub-disciplines (crops, soils, and plant biology) within the Department.

3. As part of the above process and discussions (1 and 2 above), the department should develop interdisciplinary research clusters encompassing both research and extension faculty focused on strengths, and informally or formerly designate these clusters as areas of research foci that can be used to recruit graduate students.

4. The department should establish a committee to examine combining all seminar series into one Departmental seminar series to enhance integration within the Department.

5. A proposal to hire an MS or PhD level person, at the College level, to help coordinate large grant submissions and help identify opportunities and build interdisciplinary teams should be made to the College of Agriculture Administration.

6. The faculty and staff should discuss and develop departmental guidelines to facilitate professional development for staff, and to recognize contributions of technical staff to patents and publications.

7. The department chair should consider scheduling administrative staff meetings on a regular basis. (Suggested frequency = monthly)

8. The review committee strongly recommends that the graduate students re-establish the graduate student organization and include faculty advisors in this organization.

9. The review committee recommends that the graduate students have representatives at departmental functions such as faculty meetings, appropriate departmental committees, and faculty search committees.

Implementation Plan

UK Program Review Implementation Plan

*This **required** form is described as Appendix A in AR II-I.0.6.*

College/Unit: Plant and Soil Sciences **Date: August 17, 2012**

Recommendation/ Suggestion	Source I/E/H*	Accept/ Reject**	Unit Response (resulting goal or objective)	Actions (including needed resources)	Time Line
The department should develop a strategic planning process that would foster engagement with larger, longer-term issues in order to have guidelines for making the more immediate decisions on where to invest their resources.	E	A	Strategic planning will inform and guide decisions for the allocation of department resources.	The chair will involve the advisory committee in setting the goal and deadline for the planning process. We will need an endpoint for the deliberations. Faculty volunteers will be sought to drive the planning process. Multiple planning meetings leading to a departmental retreat has been suggested as a path to follow.	1 year
The entire Department needs to discuss and resolve several major issues facing the Department. The College of Agriculture and the Department of PSS are getting smaller – what areas and/or responsibilities will be given up? Examples of the long-range type of issues that need to be discussed include the undergraduate HPLS curriculum, research foci within the Department given reduced number of faculty, extension foci – given reduction in Extension FTEs. The review committee suggests that the new IPSS graduate program might serve as a mechanism to integrate the various sub-disciplines (crops, soils, and plant biology) within the Department.	E	A	Strategic planning will inform and guide our department's direction and emphases as we proceed from this periodic program review.	Proceed based on the plan developed in action 1.	2 years
As part of the above process and discussions (1 and 2 above), the department should develop interdisciplinary research clusters	E	A	Move to embrace and strengthen the IPSS graduate program and to encourage research productivity by enhancing the graduate program.	Proceed based on the plans developed in actions 1 and 2. Encourage multidisciplinary investigations within our department as a foundation	Long term

encompassing both research and extension faculty focused on strengths, and informally or formally designate these clusters as areas of research foci that can be used to recruit graduate students.				for applications to multidisciplinary grant RFPs.	
The department should establish a committee to examine combining all seminar series into one Departmental seminar series to enhance integration within the Department.	E	A	Move to embrace and strengthen the IPSS graduate program and to encourage research productivity by enhancing the graduate program.	Establish decision committee Establish implementation committee Provide necessary funding for external speakers from Research Enrichment Program as a priority for those funds	1 year
A proposal to hire an MS or PhD level person, at the College level, to help coordinate large grant submissions and help identify opportunities and build interdisciplinary teams should be made to the College of Agriculture Administration.	E	R	This support is available from the college and is valuable and needed; additional college level support is not the continuous hands-on support the department is expressing our desire for. The department faculty wants a close relationship to a qualified individual providing constant direct interaction for both facilitating large interdisciplinary proposals and for managing the multi-institution interactions required once a proposal is funded.	We suggest finding funding from our own sources for two years of support. Continuing support would need to come from grant sources supporting the position. If the position is not fundable from increased grant activity then the position would not be justified.	
The faculty and staff should discuss and develop departmental guidelines to facilitate professional development for staff, and to recognize contributions of technical staff to patents and publications.	E	A	Our staff members are valuable individuals within our department. Professional improvement of our staff members is a goal for both the department and the individual staff.	Discuss staff professional development needs at semi-annual department staff meetings. Identifying and designating funds for staff meeting attendance, project presentations, and training programs would be valuable.	2 years
The department chair should consider scheduling administrative staff meetings on a regular basis. (Suggested frequency = monthly)	E	R	After further discussions with the administrative staff employees, there was no consensus that a formal meeting pattern was needed. The department chair will continue to routinely meet with the department's management staff on an individual basis. The chair will meet with all staff providing department management functions at least annually.		

			The chair currently meets with all department staff biannually.		
The review committee strongly recommends that the graduate students re-establish the graduate student organization and include faculty advisors in this organization.	E	A	Move to embrace and strengthen the IPSS graduate program and to encourage research productivity by enhancing the graduate program.	Identify and appoint faculty advisor. Identify organizing leadership among returning graduate students. Encourage activities of interest and benefit to graduate students both now and for their future careers.	1 year, annual re-establish-ment will be required as graduate student leaders will change constantly
The review committee recommends that the graduate students have representatives at departmental functions such as faculty meetings, appropriate departmental committees, and faculty search committees.	E	R	The department will continue to involve graduate students in appropriate committees such as graduate program curriculum review committees and graduate program seminar committees. Appointing a single graduate student representative to faculty affairs committees would provide experience to that individual student but would not provide an overall benefit to all graduate students. Turnover of graduate students serving on these committees is also problematic.		

*** Source of Recommendation (I = Internal recommendation; E = External Review Committee recommendation; H = Unit Head recommendation)**

**** Accept/Reject Recommendation (A=Accept; R=Reject)**

Todd Pfeffer

Dean Scott Smith approved by email

Unit Head Signature: _____ **Unit Head Supervisor Signature:** _____ **Date: 17 August 2012**