From:	Bridges, Brenda
To:	Avant, Bob; shay-simpson@tamu.edu; McCutchen, Bill; Bill Rooney; John Mullet; Mike Gould; Steve Searcy; James Richardson
Subject:	Onepagers for Kholsa meeting tomorrow
Date:	Wednesday, September 16, 2009 1:21:34 PM
Attachments:	TexasA&MAgriculture.pdf BioenergyBioproducts1 (2)revisedSep09.pdf Sorghum.pdf Purpose Designed Crop Plants for Biofuels Weslaco.pdf Gasification Research.pdf Pyrolysis Research Lab.pdf Linking Biofuels Market Prospects & Plant Financial Success Under Bioenergy Policies.pdf Logistics.pdf

---

All,

Attached are the onepagers that will be included in the folder for Mr. Kholsa (Sun Microsystems) for tomorrow's meeting in Houston. If you have changes, please get them to me ASAP.

Thank you.

Brenda Bridges
Program Associate
Texas AgriLife Research Corporate Relations
College Station TX 77843-2583
O: (979)862-7136
C: (979)324-7823
Fax (979)458-2155
http://agbioenergy.tamu.edu
Go green! Please consider the environment before printing this.

AgriLIFE RESEARCH
Texas A&M System

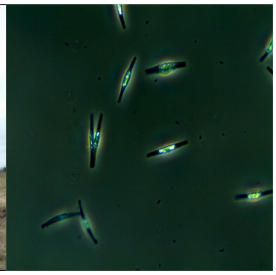
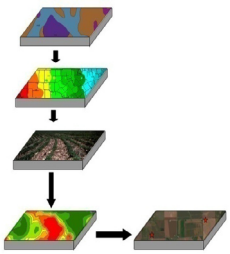
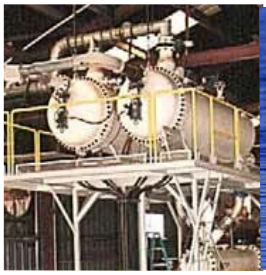
Improving Life Through Science and Technology.

Bioenergy and Bioproducts

Texas AgriLife Research, a part of the Texas A&M University System, is a national leader in bioenergy and bioproducts research, development, and commercialization because of its programs, expertise, infrastructure, and partnerships.

- 14 academic departments at Texas A&M University, ranging from engineering to genetics to economics
- 13 research stations with capability of production evaluation under varied climatological and soil conditions, from desert to high rainfall and tropical to temperate
- 400 faculty members and 1600 employees
- Strategic partnerships with industry in feedstock production, chemicals, equipment, and conversion technologies
- Sponsored research programs with the State of Texas and federal agencies




Feedstock Crops | Modeling | Agronomic Practices | Production Logistics | Microbial/Enzymatic Systems | Conversion Technologies | Economic, Policy, & Environmental Issues

Dedicated energy crop development for advanced biofuels and bioproducts

- High-tonnage nonfood sorghums as a lignocellulosic feedstock (10–15 dry tons/acre/year)
- Energy cane as a nonfood lignocellulosic feedstock (15–20 dry tons/acre/yr)
- Hybrid sweet sorghum as an ethanol and bioproduct feedstock
- Wide hybridization of energy crops to custom tailor composition and tonnage
- Sustainable production practices focused on optimized inputs for high-tonnage production of annual and perennial crops
- Advanced machine systems for production, harvest, transport, and storage

Economically sustainable oilseed crops for biodiesel and bioproducts

- Conventional and exotic oilseeds for commercialization potential
- Germplasm for commercial production
- Minimum production cut off of 100 gal/oil/acre annually (current oil production yields range from 35 to 50 gal/acre using conventional oilseeds .)
- Sustainable production agronomics
- Machine systems for mechanical harvest
- Cost-effective oil extraction processes

Algae development for biodiesel, bioproducts, and jet fuel

- Algae screening for high biomass and oil production
- Cost-effective production practices (water quality, nutrients, carbon dioxide utilization, density, invasives)
- Economical production systems (open systems)
- Extraction processes (chemical, mechanical, electrical)
- Separation processes , by-product development, disposal

For more information, contact
Bob Avant, Corporate Relations Director
Texas AgriLife Research
Ph: 979.845.2908 | E-mail: bavant@tamu.edu

AgriLIFE RESEARCH
Texas A&M System

Improving Life Through Science and Technology.

Sorghum Program

Sorghums are important nongrain lignocellulosic feedstocks for biofuel production. Texas AgriLife Research has a very active sorghum program that boasts about 40,000 germplasm accessions available. These are from Africa, India, Australia, China, and other locales and exhibit extensive molecular and trait diversity. Sorghum has an excellent genome platform.

Nongrain feedstocks include high-tonnage sorghums, sugarcane, energy cane, forest products, sweet sorghum, switchgrass, crop residues, oilseed crops, microalgae, municipal solid waste, and urban waste.

Lignocellulosic Crops

High-tonnage Bioenergy Sorghum (Annual)
- Long canopy duration
- Drought tolerant
- High biomass accumulation (expect >15–20 tons/acre)

Sweet Sorghum (Annual)
- High sugar content
- Drought tolerant
- Medium biomass accumulation (5–10 tons/acre)

Energy Canes (Perennial)
- Subtropical production
- High water demand
- High biomass accumulation (20+ tons/acre)

Grasses (Perennial)
- Drought tolerant
- Marginal lands
- Medium biomass accumulation (5–10 tons/acre)

Sorghum Breeding: 4 Types of Sorghum

Grain Sorghum: grain, stover
Forage Sorghum: hay, grazing, silage
Sweet Sorghum: soluble sugars, bagasse
Energy Sorghum (High Tonnage): high biomass, stover

	Residue	Woody Biomass	Switchgrass	Forage Sorghum	Bioenergy Sorghum
Biomass per acre per year that can be converted (DT)	2	5–10	8	10	15–20
Estimated cost delivered to converter	$60+	$50–$75	$60–$90	$65	$50–$60

For more information, contact

Bill Rooney, Soil and Crop Sciences, Texas A&M Univrersity
Ph: 979.845.2151 | E-mail: wlr@tamu.edu

Bob Avant, Corporate Relations
Ph: 979.845.2908 | E-mail: bavant@tamu.edu

AgriLIFE RESEARCH
Texas A&M System

Improving Life Through Science and Technology.

Texas A&M Agriculture

Texas A&M University System

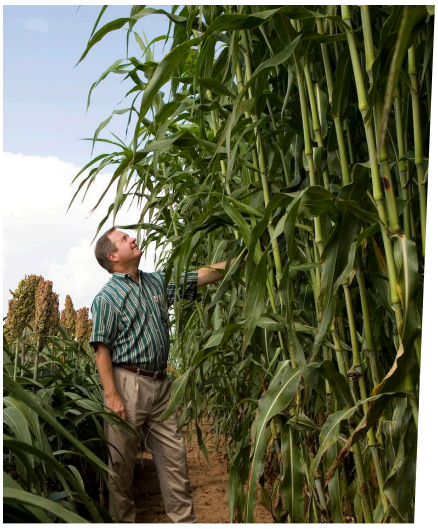
The Texas A&M University System is composed of nine universities, a health science center, and seven agricultural or engineering research/extension agencies. The three keystone agricultural entities are the College of Agriculture and Life Sciences (teaching), Texas AgriLife Research (research), and Texas AgriLife Extension (extension).

College of Agriculture and Life Sciences

- **14** academic departments: **350** faculty members
- **6,689 College enrollment: 5,613** undergrad & **1,076** graduate students
- **A "Top 3" U.S. Ag College**
- **#2 in the nation** Biological & Agricultural Engineering Departme
- **Faculty**
  - **2 Nobel Laureates and 3 Wolf Prize Recipients**
  - **4 in National Academy of Sciences**
  - **1 in National Academy of Engineering**

Texas AgriLife Research

- **13 Research and Extension Centers and 7 Institutes**
- **859 Contract and Grant Awards, with $68 million in Contracts and Grants**
- **$171 million in Total Expenditures**
- **380 faculty members located statewide**

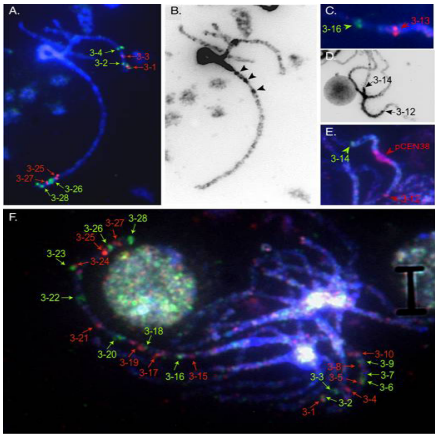


Texas AgriLife Extension

- **950 professional educators across Texas**
- **814.1 million direct teaching exposures in Texas (2007)**

Academic Disciplines

- **Agricultural Economics**
- **Agricultural Leadership, Education, and Communication**
- **Animal Science (largest in U.S.)**
- **Biochemistry/Biophysics**
- **Biological and Agricultural Engineering**
- **Ecosystem Science and Management**
- **Entomology (educates more than a third of U.S. entomologists)**
- **Horticultural Sciences**
- **Nutrition and Food Sciences**
- **Plant Pathology and Microbiology**
- **Poultry Science (largest in the world)**
- **Recreation, Park, and Tourism**
- **Soil and Crop Sciences**
- **Wildlife and Fisheries Sciences**



For more information, contact

Bob Avant, Corporate Relations Director,
Texas AgriLife Research
100 Centeq Bldg. A | 1500 Research Parkway
College Station TX 77843-2583
Ph: 512.422.6171 | E-mail: bavant@tamu.edu

From:	Bridges, Brenda
To:	Avant, Bob; shay-simpson@tamu.edu; McCutchen, Bill; Bill Rooney; John Mullet; Mike Gould; David Stelly; Steve Searcy; James Richardson
Subject:	onepagers for Regina Dugan (DARPA) meeting
Date:	Wednesday, September 16, 2009 1:26:47 PM
Attachments:	algaeProgram.pdf BioenergyBioproducts1 (2)revisedSep09.pdf InstituteforPlantGenomics&Biotechnology.pdf Linking Biofuels Market Prospects & Plant Financial Success Under Bioenergy Policies.pdf Logistics.pdf Purpose Designed Crop Plants for Biofuels Weslaco.pdf Sorghum.pdf Stelly Lab.pdf TexasA&MAgriculture.pdf
Importance:	High

All,

Attached is the set of onepagers for the meeting with Regina Dugan (DARPA). If you have changes, please get these to me ASAP.

Thank you.

Brenda Bridges
Program Associate
Texas AgriLife Research Corporate Relations
College Station TX 77843-2583
O: (979)862-7136
C: (979)324-7823
Fax (979)458-2155
http://agbioenergy.tamu.edu

AgriLIFE RESEARCH
Texas A&M System

Improving Life Through Science and Technology.

Algae Program

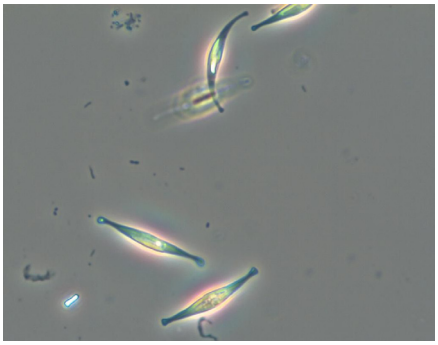
Description

Diesel and jet fuels are critical to our nation's economy and defense, which require large quantities of the fuels. The United States consumes more than 40 billion gallons of diesel annually. Also, 25 percent of fuels for military use must come from renewable sources by 2020. A clean, renewable, domestic source of fuel would have tremendous strategic and economic value. Microalgae can produce significantly more biofuel per acre than any other source. Although, under ideal conditions, microalgae theoretically can produce 15,000 gallons of oil per acre per year in raceway (open) systems, a more realistic production goal would be 5,000 gallons per acre.

Texas AgriLife Research has developed a comprehensive algal fuels development program with General Atomics and with other components of the Texas A&M University System (Texas A&M University, Texas A&M Galveston, Texas A&M Corpus Christi, and Texas A&M Kingsville). The program has received significant, long-term funding from the Texas Governor's Emerging Technology Fund, the USAF Strategic Fuels Program, and DARPA to develop technologies that can lead to rapid economical commercialization.

Overview of open raceways construction in Pecos, Texas

Algae in raceway with paddlewheel



P. tricornutum microalgae

Research and Results

The AgriLife/General Atomics team has identified eight technology challenges that must be resolved for algae to become economically viable on a large, commercial scale:

- Algae growth efficiency
- Cellular oil concentration
- Nutrient utilization
- Thermal/Environmental controls
- Carbon dioxide injection/utilization
- Production practices and facilities
- Oil extraction
- Separation technology

Texas AgriLife Research with technical support from General Atomics has constructed an algae production test facility at Pecos, Texas, that includes laboratories, greenhouses, open raceways, and processing components. General Atomics also has a production facility and laboratory in San Diego.

For more information, contact

Bob Avant, Bioenergy Prgram Director, Texas AgriLife Research
100 Centeq Bldg. A | 1500 Research Parkway
College Station TX 77843-2583
Ph: 512.422.6171 | E-mail: bavant@tamu.edu

AgriLIFE RESEARCH
Texas A&M System

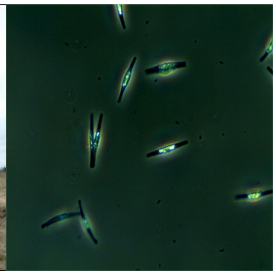
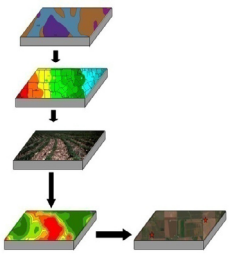
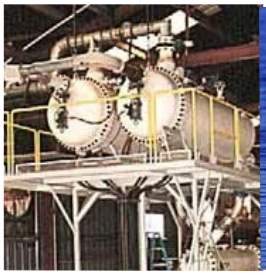
Improving Life Through Science and Technology.

Bioenergy and Bioproducts

Texas AgriLife Research, a part of the Texas A&M University System, is a national leader in bioenergy and bioproducts research, development, and commercialization because of its programs, expertise, infrastructure, and partnerships.

- 14 academic departments at Texas A&M University, ranging from engineering to genetics to economics
- 13 research stations with capability of production evaluation under varied climatological and soil conditions, from desert to high rainfall and tropical to temperate
- 400 faculty members and 1600 employees
- Strategic partnerships with industry in feedstock production, chemicals, equipment, and conversion technologies
- Sponsored research programs with the State of Texas and federal agencies




Feedstock Crops | Modeling | Agronomic Practices | Production Logistics | Microbial/Enzymatic Systems | Conversion Technologies | Economic, Policy, & Environmental Issues

Dedicated energy crop development for advanced biofuels and bioproducts

- High-tonnage nonfood sorghums as a lignocellulosic feedstock (10–15 dry tons/acre/year)
- Energy cane as a nonfood lignocellulosic feedstock (15–20 dry tons/acre/yr)
- Hybrid sweet sorghum as an ethanol and bioproduct feedstock
- Wide hybridization of energy crops to custom tailor composition and tonnage
- Sustainable production practices focused on optimized inputs for high-tonnage production of annual and perennial crops
- Advanced machine systems for production, harvest, transport, and storage

Economically sustainable oilseed crops for biodiesel and bioproducts

- Conventional and exotic oilseeds for commercialization potential
- Germplasm for commercial production
- Minimum production cut off of 100 gal/oil/acre annually (current oil production yields range from 35 to 50 gal/acre using conventional oilseeds .)
- Sustainable production agronomics
- Machine systems for mechanical harvest
- Cost-effective oil extraction processes

Algae development for biodiesel, bioproducts, and jet fuel

- Algae screening for high biomass and oil production
- Cost-effective production practices (water quality, nutrients, carbon dioxide utilization, density, invasives)
- Economical production systems (open systems)
- Extraction processes (chemical, mechanical, electrical)
- Separation processes , by-product development, disposal

For more information, contact
Bob Avant, Corporate Relations Director
Texas AgriLife Research
Ph: 979.845.2908 | E-mail: bavant@tamu.edu

AgriLIFE RESEARCH
Texas A&M System

Improving Life Through Science and Technology.

Institute for Plant Genomics and Biotechnology

A multidisciplinary organization, the Institute for Plant Genomics and Biotechnology is a composed of faculty members representing 14 units affiliated with Texas A&M University, Texas AgriLife Research, and the U.S. Department of Agriculture-Agricultural Research Service. This Institute is housed in the Norman E. Borlaug Center for Southern Crop Improvement and provides researchers a base of operations with specialized teaching and research laboratories designed with the necessary infrastructure and cutting-edge equipment for the plant science community at Texas A&M.

Plants in greenhouse

Norman Borlaug, Texas A&M Distinguished Professor of International Agriculture, is credited with saving more lives than anyone else in the history of the world by developing high-yielding, short-strawed, disease-resistant wheat varieties and taking these new cereal strains to Third World countries to feed the hungry. He is one of only five people to receive the triple honor of the Nobel Peace Prize, the Presidential Medal of Freedom, and the Congressional Gold Medal.

Norman E. Borlaug
Center for Southern Crop Improvement

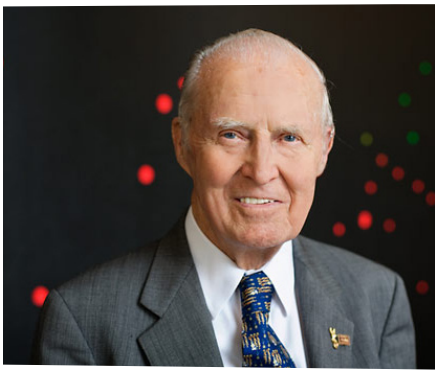
Research projects at the Institute for Plant Genomics and Biotechnology include the development of transgenic plants for disease and stress resistance and high-value proteins, as well as the platform for biotechnology research in food, fiber, and health. Additionally, the Institute performs DNA diagnostics for AgriLife Research and serves as the home of the Texas Cotton Biotechnology Program. Specific research in cotton has led to the creation of ultra-low-gossypol cottonseeds that could provide malnourished people with a high-quality protein and serve as a value-added resource to the cotton industry.

Next-generation DNA sequencing and genetic marker development using the Illumia platform has elevated AgriLife Research to a leadership position in the bioenergy crop development industry, most notably around sorghum. This applied research crop is grown in more than 12,000 square feet of greenhouses, 22 growth chambers, and 3 growth rooms.

Greenhouses in annex

"It's a different world. What were many impossible genetic dreams two decades ago are now, because of the new transgenic engineering technologies, on the verge of becoming realities."

Dr. Norman Borlaug, at the dedication of the Norman E. Borlaug Center for Southern Crop Development, October 1999



Norman Borlaug

For more information, contact

Bob Avant, Corporate Relations Director
Texas AgriLife Research
100 Centeq Bldg. A | 1500 Research Parkway
College Station TX 77843-2583
Ph: 979.845.2908 | E-mail: bavant@tamu.edu

Marty Dickman, Director
Institute for Plant Genomics and Biotechnology
107A Borlaug Center, Texas A&M University
College Station TX 77843-2123
Ph: 979.862.4788 | Email: mbdickman@tamu.edu

From:	Stelly David
To:	Loeppert Dick; Hallmark Tom; Zuberer David; Zhang Hongbin; Smith C. Wayne; Scott Senseman; Baumann Paul; Joe Cothren; McInnes Kevin; Chandler J. Michael; Rooney Bill; White Richard; Sam Feagley; Kevin Bronson
Cc:	Young Judy; David Baltensperger
Subject:	P&T Subcommittee
Date:	Saturday, September 12, 2009 12:19:06 AM
Attachments:	SCSC PnT subcomm draft09i11ds.pdf ATT00015.htm

Dear Gents,

We are fast approaching the P&T process that we go through each fall, and the Department needs a few minutes of your time to facilitate this process. The target the overall SCSC P&T Committee voting will tentatively be **NOON Sept. 21 (Mon)**;

Before then, we need a couple of individuals to conduct a detailed review of a each candidate and to subsequently report a short assessment to the overall SCSC P&T Committee, and add in those comments, to prepare for presentation to the overall P&T Committee. I developed a list of prospective reviewers in consultation with Dr. Baltensperger, and thus the prospective membership of this P&T Subcommittee.

Please see the accompanying image of a Table in which I have indicated 2 diverse reviewers for each candidate (7), one a mentor and one not a mentor of the respective candidates. We need contrasting perspectives to be maximally effective. Please let me know ASAP if there is a glaring problem that you see in this strategy or ad hoc assignments.

As a member of this Subcommittee you will called upon for only
1 assessment to complete for this Subcommittee,
1 written synopsis to prepare, share and orally present at the **prospective subcommittee meeting sometime Wed Sept 16**; incorporate subcommittee suggestions & comments
1 similar oral synopsis (perhaps also reflecting additional input by the subcommittee) to the Overall SCSC P&T Committee on Monday Sept 21.

Would you please do the following:

[1] INDICATE THAT YOU ARE WILLING TO SERVE ON THIS SUBCOMMITTEE?

[2] Conduct the indicated in-depth assessment?

[3] **SUBCOMMITTEE MTG:** State the times at which you are available (15-minute increments) **Sept. 16 (Wednesday)**, or times not available (TELL US WHICH YOU STATING -- available or unavailable)

[4] **OVERALL COMMITTEE MTG:** Whether or not you can attend the **Sept 21 Monday meeting**, 12 - 2(?), and if you cannot attend, who you think might be a good choice to present your synopsis to the Overall P&T Committee.

[5] PLEASE EMAIL the answers to the above to ME and to JUDY YOUNG, preferably using the SAME SUBJECT LINE.

THANKS!!

David Stelly

stelly@tamu.edu

O: (979) 845-2745

2009 FALL SCSC P&T
SUBCOMMITTEE DRAFT 09i11

Primary

Secondary

Faculty Tenure/Promotion History - Soil & Crop Sciences

MENTORS	Reviewer-1	Reviewer-2	Type of Review (2009)	PROF Name	LOC		TITLE
Feagley, Hallmark	**Loeppert**	**Hallmark**	M	AITKENHEAD-PETERSON, JACQUELINE	Campus	s	ASST
Zuberer, Hons	**Zuberer**	**Zhang**	M	GENTRY, TERRY	Campus	p	ASST
Wayne Smith	**Smith**	**Senseman**	M	HAGUE STEVEN	Campus	P	ASST
Feagley* Hons, Wiedenfeld (Weslaco)	**Baumann**	**Cothren**	P	PROVIN TONY L	Campus	s	ASSO
Hallmark, McInnes	**McInnes**	**Chandler**	P&T (ext: 2009)	MORGAN CRISTINE L	Campus	s	ASST
L Rooney, B Rooney, L. Nelson	**W Rooney**	**White**	T	IBRAHIM, AMIR	Campus	p	ASSO
Hallmark, Trostle, Feagley	**Feagley**	**Bronson (LBB)**	M	GANJEGUNTE, GIRISHA	El Paso	s	ASST

From:	Stelly, David
To:	Undisclosed-recipients:
Cc:	Stelly, David
Subject:	P&T: 1 revised and 1 new ad hoc review
Date:	Wednesday, September 16, 2009 10:06:15 AM
Attachments:	Peterson-THallmark.doc Provin-LRedmon-2.doc

Evaluation of

Dr. Jacqueline Aitkenhead-Peterson

for the Departmental Tenure Subcommittee

Dr. Peterson joined the TAMU faculty as an Assistant Professor of Urban Soil and Nutrient Management in November, 2006 with a 40% teaching and 60% research appointment. The following evaluation will concentrate on her record at TAMU.

Teaching Evaluation:

Dr. Peterson began teaching two months after her initial appointment offering undergraduate/graduate stacked courses in Water and Nutrient Management (AGRO 489/689) that included lecture and laboratory. Afterwards, other courses included a similar course in Spring 2009 but without the laboratory; co-teaching Methods of Soil Analysis (AGRO 618) twice; a seminar (AGRO 681) on Issues in Urban Soil and Water twice; and Forensic Soil Science (AGRO 489/689) in the fall 2009. Student evaluations have been highly favorable with evaluation averages substantially and consistently above that of the departmental average. Student comments on teaching are highly complimentary as are those of the faculty. Dr. Peterson has been creative in developing new courses as an effort to engage students from other disciplines into water and soil issues. Examples are the development of the Forensic Soil Science course which teaches basics of soil science but geared to draw upon the current interest in forensics and a study abroad course to Scotland scheduled for Summer 2010 that targets students wanting an international experience. Her energy and enthusiasm for teaching and mentoring are apparent in comments included in her packet, and noted in her supporting letters. She continues to strengthen her teaching skills through the three teaching workshops she has attended this year. Her rapport with students is excellent, and her mentoring skills are outstanding, so much so that she was nominated for an outstanding mentoring award sponsored by Women in Agronomy as part of the awards program of the American Society of Agronomy. Her graduate students have been encouraged to develop professionally, and present research at state, regional and national meetings and compete for scholarships and awards; presently, they have received six scholarships and awards. Additionally, she has engaged with two undergraduate students to give them laboratory and research-oriented experiences. One of those students was recognized as an Undergraduate Research Fellow. Further, she has worked with a high school student on his science project; his project was recognized as the best "water project" at regional competition, and 5th best in the entire science fair. It is apparent that Dr. Peterson has a gift of working with students and should be encouraged to continue her efforts in teaching.

Research Evaluation:

Dr. Peterson's efforts in research coincide strongly with her teaching, working closely with undergraduate and graduate students, and using research as a platform to teach. It should be noted that when she arrived at TAMU, she had a start-up package, but a laboratory that needed a good deal of work to make it acceptable and functional. Much of the labor and effort in setting up the laboratory was hers. Today, that laboratory is well run, and highly functional as a result of her efforts. She has four PhD and 2 MS students currently. Her record shows strong activity

to put her research findings before her peers at state, regional, national and international professional meetings. For example, since January 2008, she, co-workers, and her students have presented 13 papers at five different meetings, including two in Europe. Her publication record is strong having published 12 refereed journal articles on which she was first or second author on eight, and the journals are well respected and appropriate for each publication. Although she has been at TAMU less than three years, she already has one published article and two in review from research in Texas. She indicates that an additional 13 manuscripts are in preparation or planned of which six deal with research in our state. In addition, she has two book chapters to her credit. The work of Dr. Peterson has gained international recognition as evidenced by the six invited talks at foreign institutions. She has a strong record of grantsmanship at the University of New Hampshire where she played the key role in securing $1.4 million in external funding from NSF and NOAA over a six-year period while in a post-doctorial type position (Post-Doc Research Associate and Research Assistant Professor). At TAMU, Dr. Peterson has applied for and was granted $168,000 in internal grants, but could not use $84,000 of that as the potential graduate student elected to seek other opportunities. She and collaborators have submitted proposals for about $1.86 million; of that, $1.3 million was to NSF and NRI and was not funded. Currently a grant proposal of $651,000 has been submitted and is pending. Dr. Peterson has a strong record of collaboration both in research and teaching, and has attended and actively participated in the annual Soils Critique each year since her arrival. In summary, she has initiated a vital and dynamic program of research that is just now reaching the point that will provide the basis for successful grants and publications. She is to be encouraged to continue the high quality research she has performed since arriving and to continue her funding efforts and not be discouraged as these are times of shrinking funding opportunities and her program is just now getting to the point that funding institutions will take notice.

Service Evaluation:

Dr. Peterson has a good record of service in the department, having served on an average of two faculty search committees each year plus one to two standing departmental committees. She has been involved in broadening curricula to include more international opportunities at the college level through task force involvement, and at the university level through working with the Study Abroad Office. She has served to review numerous manuscripts and research proposals for a variety of journals and funding entities. She is a member of four professional organizations, and suggested a book to the American Society of Agronomy on Urban Ecosystem Ecology for which she is serving as co-editor. Weakness in the service area is lack of committee and officer involvement at the regional and national level.

SUMMARY:

Dr. Peterson's progress toward tenure at TAMU is on-track. She has proven to be an effective teacher and mentor of students, shows great promise in her research, has been dedicated to putting her science before peers through presentations and publications, and continues to show the dedication and enthusiasm that we encourage in young faculty.

Evaluation Criteria for Dr. Tony Provin
Candidate for Professor and Extension Specialist

Position Description:
Dr. Provin directs the operations of the Texas AgriLife Extension Service Soil, Water and Forage Testing Laboratory and facilitates internal and external linkages to improve nutrient and fertilizer recommendations and utilization through research and extension programming, while assisting County Extension Agents (CEA's), other Extension specialists, researchers, other state agencies, and outside individuals with issues regarding laboratory analyses and interpretation of results. He has a 100% Extension appointment.

Program Development Activities and Planning
Dr. Provin has worked closely with CEAs, District Extension Administrators, Regional Program Directors, and other faculty, but due to his position as lab director has not been involved in as many program development and planning activities as other Extension specialists. Despite the additional load of directing the lab, he has, however, been quite active in this particular aspect of Extension.

Teaching Effectiveness and Quality
Again, due to his involvement in directing the lab, Dr. Provin does not participate in county educational programs to the same extent as do other Extension specialists. He has, however, developed a significant number of Extension fact sheets, bulletins, and other publications regarding the lab. He has likewise been very supportive of county result demonstrations, soil testing campaigns, and applied research studies that have served in lieu of actual face-to-face extension meetings.

Quality of Program and Organizational Support
Dr. Provin has supported Extension in a number of methods. He has participated in county educational programs as requested, provided discounted sample analyses for both soil and forage result demonstration programs. This support has been invaluable to county-based faculty in their educational activities and programs. Dr. Provin has also been very active in grantsmanship and has served as PI or Co-PI on grants totaling over $10 million during his career. This is extradordinary for an Associate Professor and Extension specialist.

Cooperation and Collaboration
His collaborative efforts have included not only many other Extension faculty, but has also include TAMU and Texas AgriLife Research faculty members from several departments from the College of Agriculture and Life Sciences. Dr. Provin has also been extensively involved with several state and federal agency personnel. His level of collaboration both in the field and the lab has enabled other faculty members to advance their careers in a substantial way.

Scholarly Contributions and Professionalism
Dr. Provin has received honors both as an individual and, possibly more importantly, as the member of several teams. This again indicates not only productivity but also the collaborative nature of Dr. Provin. He is an active member of the Soil Science Society of America and routinely attends the annual ASA meeting and has provided over 70 professional abstracts. He

is a member of several honorary societies and has demonstrated international activity by interacting with several foreign scientists relative to issues related to soils and water. Finally, Dr. Provin's peer-reviewed publication record is excellent for any faculty member at this stage of his career. Additionally, he has contributed to four book chapters. Dr. Provin, therefore, has demonstrated a excellent record of scholarly contributions and professionalism.

Dr. Provin has proven to be an effective extension educator as evidenced by his participation in educational program planning and implementation; he has demonstrated the ability to cooperate and collaborate with a wide range of TAMU and Texas AgriLife faculty and other state and federal agencies; has shown considerable regional, national, and international involvement; and he is recognized by his peers from other institutions. Thus, in reviewing the criteria for promotion to Professor and Extension Specialist as stated by the Texas AgriLife Extension Service policy, I believe that Dr. Provin has met and exceeded the criteria and should be promoted.

From:	Stelly David
To:	Undisclosed-recipients:
Cc:	Stelly David
Subject:	P&T: drafts in hand
Date:	Wednesday, September 16, 2009 10:03:15 AM
Attachments:	Ganjegunte - SFeagley.docx Ganjegunte-KBronson.rtf Hague-LNelson.docx Ibrahim Tenure-WRooney.pdf Morgan-DVeitor.doc Morgan-KMcInnes.docx Provin-LRedmon.doc Provin-PBaumann.doc ATT00005.txt

---

I am simply sharing drafts of reports received up to this point. We are making good progress.

You may draw ideas from each others approaches.

I think it key that we think of our purpose as determining what the candidate has been doing meets the needs of their position within our institution, and projects a high likelihood of success at the next level, or not. It is not to recount items in the portfolio, per se (we are instructed not to do so), but rather draw from the portfolio evidence that would be considered great, good, so-so, or sub-par; we will be called upon to relate those analyses to the P&T vote, whatever that might be.

See you in a couple of hours.

David

September 15, 2009

Dr. David Stelly
Soil and Crop Sciences Department
Texas A&M University
2474 TAMU
College Station, TX 77843-2474

Dear David:

I serve on Dr. Ganjegunte's mentoring committee and have been impressed with his progress. Dr. Ganjegunte started his position in 2006 and has a 100% Research appointment at the Texas AgriLife Research Center in El Paso. He is a certified professional soil scientist. Since he does not have a teaching appointment, I will comment on only research and service.

Research:

Dr. Ganjegunte has more than 12 years of research experience in the areas of salinity management, irrigation water quality and carbon sequestration. His research program specializes in beneficial uses of waters with elevated salinity, soil-water salinity interaction, on-farm water conservation and desalination concentrate management. Current research includes agricultural irrigation of electric cooling tower reject water (blowdown water) and graywater, on-farm water conservation, soil salinity management using organic polymers and evaluation of electromagnetic induction method for rapid assessment of salinity at a high spatial resolution.

He has 15 peer reviewed journal articles, being first author on 11. He has two manuscripts in the review process and three in various stages of development. All of the submitted and in progress manuscripts are from research conducted in Texas. He has two book chapters, several grant final reports, and several meeting abstracts from national and international meeting presentations. He has obtained grants and contracts since 2006 totaling about $114,000. He is on the grant proposal tread mill and is obtaining grant funds at a steady pace.

Service:

Dr. Ganjegunte serves as the chemical safety officer for the El Paso Texas AgriLife Research Center and has served on the vehicle purchase committee. He reviews manuscripts from journals such as Soil Science Society of America Journal, Journal of Environmental Quality, Applied Clay Science, and Groundwater. He is a member of the American Association for Advancement of Science, Soil Science Society of America, American Society of Mining and Reclamation, New Zealand Society or Soil Science, Indian Society of Soil Survey and Land Use Planning and Indian Society of Remote Sensing. He was awarded the 2007 Outstanding Young Agricultural Scientist Award by the Association of Agricultural Scientists of Indian Origin (AASIO). He has served on the AASIO Outstanding Student Award Committee and is currently serving as the chair of the AASIO Outstanding Young Agricultural Scientist Award Committee.

I believe that Dr. Ganjegunte is making very good progress and should be able to go forward for promotion in the next 1 to 2 years. Within 1 year he should have four or five referred journal articles on research he has conducted since arriving in Texas. He is trying to get more involved in ASA committees. He has volunteered for committees, but has not been selected. We, as his mentoring committee, are working with him to help him get assigned to a committee. We are also encouraging him to get more involved in international work.

Sincerely,

Dr. Sam Feagley
Professor and State Soil Environmental Specialist
Soil & Crop Sciences
Texas AgriLife Extension Service
Texas A&M University
2474 TAMU
College Station, TX 77843-2474
E-mail:sfeagley@ag.tamu.edu
PH: 979-845-1460
FAX: 979-845-0604

From: "Kevin Bronson" <k-bronson@tamu.edu>
Date: September 16, 2009 9:03:13 AM CDT
To: "Dirk Hays" <DBHays@ag.tamu.edu>, "Don Vietor" <DVietor@ag.tamu.edu>, "David Zuberer" <DZuberer@ag.tamu.edu>, "Richard H Loeppert" <RLoepper@ag.tamu.edu>,<dbhays@tamu.edu>, "Frank Hons" <f-hons@tamu.edu>, "Charles Thomas Hallmark" <hallmark@tamu.edu>, <hbz7049@tamu.edu>, "Kevin McInnes" <k-mcinnes@tamu.edu>, "Lloyd Nelson" <lr-nelson@tamu.edu>, "Paul A Baumann" <p-baumann@tamu.edu>, "Sam Feagley" <s-feagley@tamu.edu>, <sfinlayson@tamu.edu>, "David M Stelly" <stelly@tamu.edu>, "Bill L Rooney" <wlr@tamu.edu>
Cc: "David Baltensperger" <DBaltensperger@ag.tamu.edu>, "Carol Rhodes" <cj-rhodes@tamu.edu>, "Judy Young" <j-young@tamu.edu>, "Travis Miller" <td-miller@tamu.edu>
Subject: Mid-term review of Girisha Ganjegunte's P&T package

David:

Here is my report on Girisha Ganjegunte's dossier package for mid-term review to Associate Professor.

Girisha's area of emphasis on salinity management and wastewater chemistry and management and irrigation science and management is a very vital thrust in West Texas. Girisha is 110 % committed to this crucial program, and in short he is making excellent progress after only three years. His documented activities in grantmanship, research, publishing, service, and speaking engagements are at or above expectations. It is very impressive that his research program is multi-pronged, and that he has accomplishments to document in only in 2-3 years in the thrusts of cooling tower and wastewater reuse, irrigation efficiency, and EMI approach to salinity assessment.

Naturally his publications to present are mostly from Wyoming and his other appointments prior to coming to El Paso three years ago. But he has several journal publications in the pipeline from his Texas research. Giiven his obvious strong commitment to publishing, we look forward to seeing other pubs come out on his Texas program by the time he goes up for promotion to Associate Professor.

Grant dollars for this area of soil and water science are not easy to garnish. There appears to be some gap in funding dollars compared to the long list of current collaborators listed in the package. I would just encourage Girisha to continue to push hard for internal and federal grants. Realizing also, that it is difficult to advise graduate students being based in the El Paso center, I hope that he can still manage to advise at least one in the next 3 years.

Overall, a very good research program, and I give him high marks.

Kevin Bronson
Professor of Soil Fertility

Lloyd R. Nelson, Regents Fellow and Professor, Texas AgriLife Research

RE: Dr. Steve Hague – Dossier Review (9-14-2009)

Dr. Hague is Assistant Professor and Plant Breeder with cotton, sunflowers, jatropha, castor beans and rapeseed. He has a 75% research and 25% teaching position.

RESEARCH: Dr. Hague began his research program as a cotton breeder; however, has expanded to other crops at well. Main emphasis on cotton relates to water-use efficiency. Oilseed species relates to energy crops, or bio-diesel. I expect oilseed crop research is in an effort to obtain grant dollars. Dr. Hague had had been a cotton breeder in Louisiana, so came in with good experience. He is working with Dr. Wayne Smith in the cotton program, so is not starting from scratch. He is working with extra-long staple cotton germplasm, enhancing genetic diversity through mutation, exogenous auxin application, etc. His research with other oil seed crops should be pursued as time allows. I expect one or two of these bio-energy crop efforts should pay-off either by publications, grants, or new cultivars and germplasm releases.

PUBLICATIONS: Dr. Hague has 9 pubs listed as journal papers, of which he is senior author on 4. Five are after he was hired at A&M. He is in very good shape with journal papers, if he continues at this level over the next 3 yrs. He has 2 book chapters, of which he is senior author on one. He has 28 proceeding papers, which is outstanding. He has 3 invited international, and 3 national presentations. He has 2 patents on FiberMax FM cotton for 2006. Overall, this record would likely merit his promotion even at this date.

GRANTS and FUNDING: Dr. Hague's external grant funding as PI is at $172,590.00. As Co-PI he has $385,500 to date. From internal funding he has $105,000 as PI and as gifts-in-kind he has $88,500. For a traditional plant breeder, these amounts are very good considering he has only been employed for three plus years.

TEACHING: Dr. Hague has taught 4 classes, or which 2 are undergraduate (SCSC 304 and SCSC 421) and 2 graduate level (SCSC 621 and SCSC 689). He has or had 4 graduate students, or which one received his M.S. Degree, and others are still in graduate school. From his pre- and post course survey, it appears he improve the students appreciation for plant breeding and for public support of university and USDA plant breeding programs. It was stated that in all of the classes he has taught have shown increased enrollment in subsequent semesters. He was involved in a Special Topic class to visit International Ag. Res. Centers in Mexico. This certainly took a

great deal of Dr. Hague's time to organize this class.

ROYALTIES: I saw no evidence of any royalties being collected in his program. He does have two plant patents in 2006; however, will any royalties be collected in relation to these patents? I expect this is the accepted protocol for the cotton program with Texas AgriLife Research. Never-the-less I see this as a negative aspect of his program. Some royalties need to be produced to support the cotton breeding program, the unit, and for his personnel income. Perhaps royalties could be forthcoming from the oilseed crops.

SERVICE: His service to state, national, and international organizations seems quite outstanding for a young scientist. I would expect he will continue this effort and likely be elected to several regional and national offices during his career. His international interaction first in Mexico, but also in China, and cooperative efforts and numerous contacts may result in international grants and/or contracts. This effort should be pursued; however, he needs to make sure these efforts are productive and not just time consuming so as to reduce efforts in his research program and plant breeding projects.

In summary, I would rate Dr. Hague performance over the past 3 years as above average and that he is well on his way to being a successful scientist and teacher in the Department of Soil and Crop Sciences. I would not expect him to have any problems in being promoted to Associate Professor in the next 2 or 3 years.

AgriLIFE RESEARCH & EXTENSION
Texas A&M System

TEXAS A&M UNIVERSITY

COLLEGE OF AGRICULTURE
AND L FE SCIENCES

Department of Soil and Crop Sciences

August 19, 2009

To:

I have reviewed the tenure packet of Dr. Amir Ibrahim and based on the documentation, it is my recommendation that Amir be given tenure.

Dr. Ibrahim has been on faculty at Texas A&M University since 2007 as an Associate Professor and Small Grain Breeder. Prior to this position, Dr. Abrahim was a winter wheat breeder at South Dakota State University. At South Dakota State University, Amir started as an Assistant Professor and rose through the ranks to Associate Professor with tenure. At Texas A&M University, Amir is responsible for the small grain breeding program for both oat and winter wheat.

It is my recommendation that given tenure based on the following assessment.

1. Dr. Ibrahim developed and taught several courses at SDSU; he has continued that trend here at TAMU. He is now teaching an experimental design course that has had both good enrollment and good ratings. It is an important and needed course in our graduate student training.
2. Dr. Ibrahim has developed a strong graduate research training component to his breeding program. He serves as advisor for three students and co-advises another three (with other faculty in our department).
3. In the past two years, Dr. Ibrahim has reestablished the small grains breeding program at College Station to critical mass. I expect him to produce new and useful oat and wheat varieties for South and Central Texas.
4. Dr. Ibrahim has established his ability to procure traditional sources of funding to provide base funding for the breeding program. He is collaborating with additional scientists to procure funds from more non-traditional and competitive sources (ie, the AFRI grant).
5. Dr. Ibrahim is studying application of wheat production in new and innovative ways. While not all of these may be successful or adopted, it is the role of public breeding programs to develop innovative approaches and uses of our important crop plants.
6. With regard to publication, Amir has 18 published journal articles. In addition, over his career he has released eight wheat cultivars. This publication and release record is acceptable for a breeder. (He lists another 4 as submitted and 14 in preparation – I would remove these from the package and just provide those that are published, in press or accepted).

In summary, Dr. Ibrahim has established a small grain program that will be productive; he is already well know and received by his colleagues in wheat breeding. His program is funded and he is publishing the results of his research. It is my opinion that Dr. Ibrahim is certainly qualified for tenure in the Department of Soil and Crop Science at Texas A&M University.

Sorghum Breeding and Genetics
Department of Soil & Crop Sciences
2474 TAMU
Texas A&M University
College Station, TX 77843-2474

Tel. 979.845.2151
Fax. 979.862.1931
wlr@tamu.edu

Review of Cristine Morgan's packet.

Cristine's packet thoroughly and effectively presents here career accomplishments in support of her evaluation for promotion/tenure. In addition to teaching an undergraduate soils course over five years, she successfully initiated and collaboratively taught a graduate-level geospatial statistics course. In addition to presenting a conceptually distinctive teaching philosophy, she provided quantitative documentation of outstanding student ratings of her teaching. In addition, her record is distinguished through her mentoring of undergraduate research.

Cristine has thoroughly presented her record of funded and unfunded research proposals and projects, which are clearly relevant to her position description, professional interests, and her role as a mentor of graduate students. Similarly, she has documented an enviable record of scholarly publications, including refereed journal articles, book chapters, proceedings papers, and both invited and volunteered presentations. In addition to her teaching and research accomplishments, she has contributed to professional outreach efforts locally and beyond.

The six letters of support from internationally reputable professionals unequivocally support Cristine's promotion and tenure.

Overall, Cristine's promotions packet, which effectively documents her record of teaching, research, and outreach and the unequivocal support of reputable external reviewers, is excellent. I have not suggestions for improving the package.

Don Vietor

Kevin McInnes' Summary of Cristine Morgan's Dossier

Dr. Morgan's research and teaching program has focused on development of techniques, information, and applications to aid exploration of the new frontier of high-resolution land management, and on preparing students to meet upcoming challenges. Her early career has been a productive, well-balanced blend of research, teaching, and education. Dr. Morgan joined the Faculty December 1, 2003 as an Assistant Professor of Hydropedology. I've condensed the information in her tenure and promotion packet below, and have highlighted in **bold** where her accomplishments shine and added comments to the significance in parentheses (underlined). The only matter of concern is that she has had three graduate students leave her research program without obtaining a degree. Several letters from the external reviewers refer to this issue. One of the students that quit left for financial reasons, one to pursue other interests, and one switched degree programs and joined the Department of Geology and Geophysics. Personally knowing each of these students that left, I don't feel it would have been wise for her to have worked to convince them to stay, and I think her program would have suffered had she done so.

Teaching Contributions (30% time budgeted, ~ 45% actual)

Courses taught

SCSC 310 Soil Morphology and Interpretations, 2 credit hours, taught each spring and fall semesters; SCSC 691 Undergraduate Research, variable credit; SCSC/FRSC 663 Applied Spatial Statistics, 3 credit hours, team-taught each spring semester with Dr. Marian Eriksson, Department of Ecosystems Science and Management

Advising

Undergraduate students

Texas A&M Undergraduate Research Scholars: 3

Graduate students

Committee Chair: 3 PhD, 6 MS, **Committee Member: 7 PhD, 10 MS, 3 MAg** (demonstrates willingness to collaborate)

Evaluation of teaching effectiveness

Soil Morphology and Interpretations, 157 students taught, students' evaluation 4.78/5 (demonstrates excellence in teaching skills)

Applied Spatial Statistics, 24 students taught, students' evaluation 4.63/5

Department of Soil and Crop Science average 4.47/5

Student Awards and Accomplishments (demonstrates tutelage and promotion of students)

Travis Waiser, MS Student: Outstanding Graduate Research Award, Dept. of Soil & Crop Sciences, 2005; W.G. Mills Memorial Hydrology Scholarship; 1st place oral presentation, Soil Survey Land Resources Workshop, 2005; 1st place oral presentation, Student Research Week, Texas A&M University, 2005

Omar Harvey, PhD Student: $5000 USGS Grant, 2005

Adam Helms, MS Student: 1st place oral presentation, Soil Survey Land Resources Workshop, 2008

Katrina Hutchison, MS and Undergraduate Research Scholar: 3rd place poster presentation - undergraduate, SSSA, 2007; Outstanding Undergraduate Research Assistant Award, Dept. of Soil & Crop Sciences, 2008

Scott Stanislav, MS and Undergraduate Research Student: Invited speaker for the Texas Soil & Water Conservation Society Annual Meeting, 2008; 1st, 2nd, and 3rd place oral

presentations, Soil Survey Land Resources Workshop, 2009, 2007, 2008, respectively; Undergraduate Research Support Award, Dept. of Soil and Crop Sciences, 2008; 2nd place undergraduate poster, Agricultural Program Conference, Texas A&M University, 2007

Leo Rivera, MS and Undergraduate Research Student: W.G. Mills Memorial Hydrology Scholarship, 2009; 2nd place poster - undergraduate, SSSA, 2008

Takele Dinka, PhD Student: W.G. Mills Memorial Hydrology Scholarship, 2009; $5000 USGS Grant, 2009

Teaching Awards or Recognition

Special Achievement Award for Teaching, 2007, Soil and Crop Sciences Department
Regents Scholar Mentor, 2004-2005

Self Improvement in Teaching

Faculty Teaching Academy 2007-2008, 2-semester program

Extension and service contribution (0 % time budgeted)

Guest Speaker, Texas Master Naturalists, 3-h lectures on the basics of soils and their association with ecology of Texas flora and fauna. Brazos County: Spring 2005, Fall 2005, Spring 2006, Fall 2006, Fall 2007, Spring 2009; Gideon Lincecum: Spring 2007, Spring 2009; Red River County: Spring 2004

Hosted FFA State Land Judging Workshop, ~ 60 high school and Jr.-high school students. Spring 2005, 2006, 2007, 2009; Judge, District 4-H Soil Judging Contests, 2004, 2008 (demonstrates willingness to put in extra, unrewarded effort)

Research Contributions (70% time budgeted, ~ 45% actual)

Awards or recognition received

American Association of Agricultural and Biosystems Engineering's Superior Paper Award, 2009, Sui, R. J.A. Thomasson, Y. Ge, and C.L.S. Morgan.

Research grants

41 proposals written, 23 funded, total amounts awarded as PI or Co-PI $3,209,362
Latest grant: Lead PI, $398,840, Impact of spatial and temporal heterogeneity of soil cracking on watershed hydrology, 2009-2012, National Science Foundation, Hydrology
(NSF grant demonstrates national competiveness of her research program)

Contributions to Public and Professional Organizations (0% time budgeted, ~ 10% actual)
(demonstrates State, national and international recognition)

Soil Science Society of America: 1998-present; Associate Editor Division S6 2009-present; Emerging Issues Committee, 2002-2004; Bouyoucos Conference Committee, chair 2009, member 2008-present; Organizer of 2008 Symposium, "Integrating Instrumentation, Modeling and Remote Sensing in Honor of John Norman"

American Society of Agronomy: 1998-present; Women in Agronomy Committee, 2002-present

Professional Soil Scientists Association of Texas: 2004-present, 2009 President Elect, 2008 Vice President

Southern Environ. Soil Physics Working Group: 2004-present; Host 2007; Secretary 2006

USDA: AFRI Soil Processes proposal review panel 2009; CREES Southern Regional Water Quality Coordination Project, Watershed Management Focus Group member, 2004-present

Geoderma: Editorial Board 2006-present (international journal)

Soil and Water Conservation Society: 1998-present

Water Science Faculty at TAMU: 2004-present

International Union of Soil Sciences Pedometrics Working Group: 2005-present
Annually co-hosts Soil Survey Land Resources Workshops, College Station

Professional Publications

Chapters of books written 1
refereed technical papers 19, non-refereed 3
patent disclosures 2; provisional patent 1
invited lectures, seminars, or symposia presentations 12 (demonstrates local, State, and national recognition)
abstracts from professional meetings 47

Two most significant publications originating from TAMU:

Kish, L.B., C.L.S. Morgan, and A.Sz. Kishné. 2006. Vibration-induced conductivity fluctuation (VICOF) testing of soils. Fluctuations and Noise Letters 6:L359-L365.

Waiser, T., C.L.S. Morgan, D.J. Brown, and C.T. Hallmark. 2007. In Situ characterization of soil clay content with visible near-infrared diffuse reflectance spectroscopy. Soil Sci Soc Am J 71:389-396.

Evaluation Criteria for Dr. Tony Provin
Candidate for Professor and Extension Specialist

Texas AgriLife Extension Service faculty are evaluated for promotion based on evaluation criteria as established by the Texas AgriLife Extension Service policy. Evaluation of an individual's effectiveness is based on various diverse activities that represent overall contributions in educational programming and translating technology for effective delivery to targeted audiences. A combination of critical professional endeavors forms the basis for an accurate evaluation of Extension faculty members. Listed below are the various areas for evaluation and a brief description of how Dr. Provin has met the goals for promotion to Professor and Extension specialist.

Position Description:
Dr. Provin directs the operations of the Texas AgriLife Extension Service Soil, Water and Forage Testing Laboratory and facilitates internal and external linkages to improve nutrient and fertilizer recommendations and utilization through research and extension programming, while assisting County Extension Agents (CEA's), other Extension specialists, researchers, other state agencies, and outside individuals with issues regarding laboratory analyses and interpretation of results.

Program Development Activities and Planning
Dr. Provin works closely with CEAs, District Extension Administrators (DEAs), Regional Program Directors (RPDs), Extension specialists, and Texas AgriLife Research and TAMU Faculty to develop outreach programming in soil nutrient management, and soil, plant, forage, biosolids, and water testing. Dr. Provin also works closely with Extension specialists and researchers to develop nutrient management recommendations.

Teaching Effectiveness and Quality
Dr. Provin effectively uses group-teaching methods in county and regional educational programs on soil fertility and forage/crop production. He has developed handouts, Extension fact sheets, bulletins and other publications relative to Soil, Water and Forage Testing Laboratory and crop/forage fertilization as the sole author or in collaboration with other Extension colleagues. Dr. Provin also works extensively with CEAs and specialists to develop and support result demonstrations and applied research studies in waste management, soil testing, crop production, and plant/forage analysis. Additionally, Dr. Provin provides individual and/or group training and assistance in soil testing/fertility, forage/plant and water analysis to CEAs, specialists, and faculty via one-on-one contact, mail, e-mail and telephone communications, site visits, and through formal training courses.

Quality of Program and Organizational Support
Extension program delivery involves a variety of mechanisms. One traditional mechanism has been through focus and multi-disciplinary group meetings with clientele. Since 1996, Dr. Provin has been invited to deliver 130 county-based programs with 75 of these programs being regional or multi-county in nature. Additionally, 90 of these programs were multi-disciplinary in nature with a focused interaction with faculty from Plant Pathology, Agricultural Economics, Animal Sciences, Entomology, Biological and Agricultural Engineering, Range Science and Horticulture. Dr. Provin has also been a team member for the Texas Nutrient Management

Certification program, where he has made 14 different presentations on soil testing and nutrient recommendations.

Dr. Provin has supported numerous county and multi-county based programs. This support has included discounted sample analysis for result demonstration programs, soil, water and forage testing campaigns and statistical analysis and interpretation of result demonstration studies. Collectively, he has supported 532 county-based hay shows, 35 water testing campaigns, 353 soil testing campaign representing 624 counties, as well as 725 different county-based result demonstration studies.

Finally, during Dr. Provin's career with the Texas AgriLife Extension Service, he has been a PI or Co-PI on over $10.5 million in grants and fee-based programming receipts with approximately $7.1 million directed to his program.

Cooperation and Collaboration

Dr. Provin works in a cooperative and collaborative fashion with many Extension specialists, CEAs, and faculty to provide timely soil, water and plant analysis and communicate with CEAs on fertility related matters and soil fertility problems. He also coordinates soil testing and agricultural environmental concerns with regional groups and other state and governmental agencies including Texas Commission on Environmental Quality (TCEQ), Texas Department of Transportation (TXDOT), USDA Natural Resources Conservation Service (USDA/NRCS), Texas Institute for Applied Environmental Research (TIAER), Southern Extension and Research Activities Information Exchange Group (SERA-IEG-6), and National American Proficiency Testing Program (NAPT). Dr. Provin works closely with specialists and researchers to strengthen turfgrass fertility recommendations and soil testing interpretations. He routinely confers with the Soil & Crop Sciences Extension Program Leader and Department Head on laboratory analyses and needs within the Extension Soil Chemist position. Dr. Provin also interacts frequently with Soil Environmental and Soil Fertility Specialists and NRCS staff to develop nutrient/fertility

Type	Since Last Promotion	Career
Refereed/Peer-Reviewed	16	23
Scientific Abstracts	37	72
Chapters in Books	2	4
Extension Publications	5	17
Laboratory Publications	46	108
Departmental Publications	3	7
Other Publications and	4	8

guidelines for manure and biosolids applications on Texas soils.

Scholarly Contributions and Professionalism

Professional Honors and Awards

Texas AgriLife Extension Service Team Award for Superior Service - Rio Gande Valley Nutrient Management Education (2007)
Department of Soil and Crop Sciences Special Achievement for Extension Award (2007)

Texas Environmental Excellence Award for Agriculture – Team Award (2009)

Memberships and Certifications
Soil Science Society of America
Alpha Omega Honor Society
Gamma Sigma Delta Honor Society
Sigma Xi Scientific Research Society
State of Texas Professional Geoscientist-Soil Scientist

International Involvement
Dr Provin has supported international activities through meeting with and advising both Texas AgriLife Research and TAMU faculty on laboratory analyses needs for imported samples. Additionally, he has interacted with faculty and foreign universities and governments to address soil testing analytical questions and needs. Examples of these interactions include:

- 2003 - University of Malawi-Bunda College: Increasing phosphate fertilizer availability through banding 2003-Minister of Agriculture-Afghanistan: Tour and discussion of analytical agricultural laboratory.
- 2005 - Turkmenistan: Addressing water quality and soil salinity limitations for cotton production.
- 2006 - Tunisia Agriculture and Water Resources Ministry: Tour and discussion of analytical agricultural laboratories and soil testing correlation/calibration.
- 2006 - Uzbekistan cotton production: Soil fertility including correlation/calibration approaches, (in conjunction with USAID).

Dr. Provin has proven to be an effective extension educator as evidenced by his participation in educational program planning and implementation; he has demonstrated the ability to cooperate and collaborate with a wide range of TAMU and Texas AgriLife faculty; has shown considerable regional, national, and international involvement; and he is recognized by his peers from other institutions. Thus, in reviewing the criteria for promotion to Professor and Extension Specialist as stated by the Texas AgriLife Extension Service policy, I believe that Dr. Provin has met and exceeded the criteria and should be promoted.

Paul A. Baumann, Professor and Extension Weed Specialist

Dr. Tony Provin-Dossier Review

As director of the Soil Testing Lab, Dr. Provin has been a cooperative, productive, and ingenious faculty member. What places Dr. Provin in the "exceptional" class, is his productivity beyond this appointment.

Upon his arrival at Texas A&M, he was greeted with adversity and discontent by clientele , and the prospect of managing employees who had dozens of years in the soil testing lab. Tony does not have the personality to shy away from controversy and quickly went to work to change the image of the soil testing lab and gain the trust and respect of employees who had seen the best and the worst of supervisors. The soil testing lab went from processing 30,000 samples annually when he arrived to between 40 and 60,000 today. With his lab personnel, and since his last promotion, Dr. Provin has responded to 28,734 phone calls, 83,764 emails, and 4,110 laboratory visits. He has worked with his laboratory staff to develop Quality Assurance Project Plans which are required for most federal grants. This qualification has played a role in acquisition of more than $10 million in funding.

Extension Specialists are largely measured by their impact on clientele. To this end, Dr. Provin has proven productivity as follows;

1) Bolstered by field studies, adopted the Mehlich III soil testing method which will continue to save producers money by not overestimating phosphorus requirements.
2) Worked with urban clientele to reduce nitrate-N over 65% from storm water runoff through an urban soil testing initiative in Travis Co.
3) Consistently works with County Extension Agents to promote soil testing programs, saving producers over $54 million annually.
4) Coordinated an urban soil testing program directed at reducing phosphorus applications by homeowners and subsequent impairment of surface water quality.
5) Worked with the poultry industry to develop novel methods of disinfecting, resulting in the conservation of 93 million gallons of water per year.
6) Promoted forage testing to improve the quality of forage production and the recognition of value in the eyes of both the producer and the buyer.
7) Responded to the emergency of hurricane Ike by working with other specialists and county agents to sample over 42,000 acres of crop land for salinity. The findings from this project saved producers over $82 million dollars that would have been lost trying to replant crops that could not have survived the adverse conditions.

Dr. Provin has given more than 200 county level programs at 130 venues. Considering his other responsibilities, this is a respectable number and reflects an acceptance by county agents and clientele. Presentations have concentrated on soil fertility in row crops, forages, turf, and home gardens. Dr. Provin has also been the point person on a number of county agent training programs in soil fertility.

In the area of scientific publications, Dr. Provin has had an appropriate role in the publishing of 16 journal articles since his last promotion, two book chapters, 37 abstracts, five Extension publications, 46 laboratory publications and three departmental publications. As an Extension Specialist, per AgriLife Extension promotion guidelines, specialists are not required to be a senior author on journal publications but are encouraged to play a significant role in their development as a co-author.

Dr. Provin has certainly demonstrated a cooperative nature with colleagues. It is particularly impressive that he has cooperated with 56 other faculty members and external professionals on a wide diversity of funded research projects. In addition, he has cooperated with peers on 29 field and greenhouse studies and 19 laboratory studies. These efforts have led to the garnering of more than $5.4 million since his last promotion of which $3.4 million went directly to his program. Career totals are $10.5 million and $7.1 million, respectively. Dr. Provin has also cooperated with soil and plant testing lab directors at the Univ. of Georgia, Univ. of Arkansas, Oklahoma State, Louisiana State University, and the Noble Foundation. These efforts have provided for more uniform testing and recommendation guidelines. Dr. Provin has also played informal, but significant roles in the development of biodiesel testing protocols and the creation of Material Safety Data Sheets.

Professionally, Tony has provided reviews for 48 manuscripts from nine journals. He is an active member of the Soil Science Society of America, having served on four committees. Dr. Provin has served numerous times as an advisor to the Texas Commission on Environmental Quality, The SERA-IEG-6 information exchange group, and the Brazos Valley Hay Producers Association. He has been active through 14 committee assignments within our department, four committees within AgriLife Extension, and is a member of the COALS Information Technology Advisory committee.

Internationally, Dr. Provin has cooperated with colleagues from Malawi, Afghanistan, Turkmenistan, Tunisia and Uzbekistan to address soil testing needs and analytical assessments. In addition, he has worked with TAMU faculty on laboratory analysis of imported samples.

In summary, Dr. Provin has been an extremely productive faculty member. As the soil testing lab director, his career could have been confined to the safe confines of the third floor. However, Tony recognized a need for field validation studies and cooperated with soil fertility, forage, field crops, and turf colleagues to develop the best recommendations possible. His grant acquisition and cooperative research program alone would compete favorably with most full professors in our department, despite having a full time job as the lab director. Let this guy get some sleep and promote him to Full Professor.

From:	George L Hodnett
To:	wlr@tamu.edu
Subject:	paper
Date:	Monday, August 17, 2009 9:43:47 AM
Attachments:	Hodnett et al 2009 Sorghum-Saccharum - anna internal review - 3a.doc

---

Bill,

I don't know if you have started editing the final version of the paper but here is the most updated version.

George

Elimination of a reproductive barrier facilitates intergeneric hybridization of *Sorghum bicolor* and *Saccharum*

George L. Hodnett[1], Anna L. Hale[2], Dan J. Packer[1], David M. Stelly[1], Jorge da Silva[3] and William L. Rooney[1]

[1] Dept. of Soil and Crop Sciences, Texas A&M University, College Station, TX.

[2] United States Department of Agriculture – Agricultural Research Service - Sugarcane Research Unit, Houma, LA.

[3]Texas AgriLife Research and Extension Center, Weslaco, TX.

Abstract:

Growing interest in bioenergy production has increased efforts to breed for greater biomass through intra- and inter-generic hybridization. Consequently, increasing emphasis in both sorghum (*Sorghum bicolor*) and sugarcane (*Saccharum spp.*) breeding and genetic research is being placed on enhancing both the quantity and quality of biomass and ensuring the sustainability of the crop by minimizing input requirements through breeding for biotic and abiotic stress tolerance. The ability to consistently hybridize these species would facilitate the transport of complementary traits that increase adaptability, yields, and sustainability, from one crop to another. Previous efforts to hybridize these crops have had limited success, but the discovery of a specific mutant in sorghum has eliminated at least one prezygotic barrier to fertilization. Techniques used to produce a significant amount of seed from crosses between sorghum and sugarcane are described. Using these methods, our programs have grown 1,371 intergeneric hybrids. Seed set in the intergeneric crosses was affected by sugarcane pollinators, implying that breeding and selection of sugarcane pollen parents could further enhance successful hybridization. The *Sorghum x Saccharum* hybrids described in this paper are being used for introgression of traits into both species. Unlike previous attempts to hybridize these two genera, sufficient quantities of seedlings were produced to impose selection criteria with the goal of developing a new intergeneric cultivar with potential to be used for sugar or as a biomass feedstock. The long-term objective is to combine desirable traits of both sorghum and sugarcane.

INTRODUCTION

Both sorghum (*Sorghum bicolor*) and sugarcane (*Saccharum sp.*) have been identified as potentially dedicated bioenergy crops. Consequently, increasing emphasis in both sorghum and sugarcane breeding and genetic research is being placed on enhancing both the quantity and quality of biomass and ensuring the sustainability of the crop through breeding for biotic and abiotic stress tolerance. An ideal bioenergy crop has numerous characteristics including high biomass, low input requirements, sustainability, and stress tolerance (Perlack et al., 2005). Biomass feedstocks have been explored in the past as a source of renewable energy, and today there are increasing numbers of studies assessing their strengths and weaknesses (Lipinsky, 1978; Clark et al., 1981; Goldemberg, 2007; Burner et al., 2009).

Crop improvement through breeding relies on genetic variation within the species. When this variation does not exist, or is limited, breeders turn toward wide hybridization or transgenic approaches to exploit genes from other sources. Transgenic approaches are effective for traits influenced by only a few genes and typically target a very specific trait. In addition, regulatory approval is cost prohibitive and public perception is sometimes a problem. For traits that are quantitatively inherited, introgression provides the most logical and effective approach to gene transfer, assuming that interspecific or intergeneric hybridization can be achieved. The probability of successfully hybridizing different crop species increases when the species are more closely related.

Sorghum is considered one of the closest relatives of the *Saccharum* complex, having diverged from a common ancestor as little as five million years ago (Al-Janabi et al., 1994). Guimaraes et al. (1997) illustrated this relationship by showing colinearity of 190

RFLP probes on genetic maps of *Sorghum* and *S. officinarum*. This close relationship has been recognized for some time as *Saccharum* x *Sorghum* crosses have been reported with limited success (Venkatraman and Thomas, 1932; Bourne, 1935; Moriya, 1940; De Wet et al., 1976). Bourne (1935) crossed *Sorghum x Saccharum* (with sorghum as the female parent) but was not successful. Only recently, Nair (1999) reported on the production of progeny from a *Sorghum* x *Saccharum* hybridization, but the frequency of viable progeny was low. From 3,670 well-pollinated florets only five seedlings were recovered. While there is obvious interest in creating and utilizing these hybrids between the two species, progress could be hastened by increased seed set and the ability to make selections among the resulting progeny.

The primary barrier to interspecific and intergeneric hybridization in sorghum is prezygotic; pollen tubes of alien species cease growth in pistils of sorghum before reaching the egg (Hodnett et al., 2005). Laurie and Bennett (1989) identified a sorghum trait, *Iap* (*Inhibition of Alien Pollen*), that permitted maize pollen tube growth to continue through the ovary to the micropyle when the sorghum female was homozygous for *iap*, but the recovery of sorghum-maize hybrids was not reported. Price et al. (2006) discovered that the same *iap* mutant removes the reproductive isolation between sorghum and several closely related wild taxa (*S. angustum, S. macrospermum* and *S. nitidum)* allowing the relatively easy production of new interspecific hybrids. Following this work, Kuhlman et al. (2008) documented the backcrossing of the previously described *S. macrospermum* hybrid to cultivated sorghum through the derivation of stable inbred lines with confirmed introgression from *S. macrospermum*. This introgression proves that

large segments of chromosomes can be moved across Poaceae species, which can facilitate the intergeneric transfer of important and quantitatively inherited traits.

Given the potential benefits to sugarcane and sorghum crops and the renewed interest in both crops as bioenergy feedstocks, there is a logical interest in hybridization to combine their desirable characteristics. These characteristics include, but are not limited to, drought tolerance and wide adaptation from sorghum along with sugar concentration and perennial growth habit from sugarcane. Another potential benefit of wide hybridization between the species is the possibility of introducing the seed production capacity of sorghum into sugarcane and, in the long-term, developing a sugarcane variety that can be planted from true botanical seed as opposed to the current labor-intensive whole-stalk or billet planting methods. The objective of this study was to determine if sorghum germplasm possessing the *iap* mutant can be used to increase the frequency of sorghum/sugarcane hybrids and to assess the relative effect of sugarcane pollinators on seed set and progeny viability.

MATERIALS AND METHODS

Production of Sorghum/Sugarcane Hybrids: Seed of Tx3361, a line homozygous for *iap* and segregating for male sterility (Kuhlman et al. in review), was planted in pots in the greenhouse from mid-July through mid-September to ensure flower synchronization between the sorghum and sugarcane plants. At the onset of anthesis, male sterile plants of Tx3361 were identified based on anther phenotype and isolated from unknown pollen by covering with a paper bag. Sorghum/sugarcane pollinations were made at the USDA-ARS Sugarcane Research Unit in Houma, Louisiana between late September and early

November of 2007 and 2008. Additional pollinations were made in College Station, Tx in January and February of 2009. Tx3361 was used as the female parent. A total of 67 basic and commercial sugarcane breeding lines were used as male parents.

In 2007 pollinations made in Houma were completed by dusting the sorghum panicle with freshly collected sugarcane pollen and by rubbing the sorghum panicle through the sugarcane tassel. Male parents included one released commercial sugarcane variety, one released energy-cane variety, three commercial breeding lines, four *S. spontaneum* accessions, and one *Erianthus* accession. Also included were six clones resulting from wide hybridization (basic breeding lines). These included clones resulting from the following crosses: one *S. spontaneum* x sugarcane (F_1); one *S. officinarum* x sugarcane (F_1); one spont complex (*S. spontaneum x S. spontaneum)*; two F_1 x sugarcane (BC_1); one BC_1 x sugarcane (BC_2). In addition, one cross was made using multiple male parents (a polycross). In 2008, crosses were made by tapping tassels of a single sugarcane parent over the top of one to three sorghum panicles. To improve pollen load on the panicle, this was followed by rubbing the sorghum panicles into the sugarcane tassels. For a single cross, pollinations were repeated for 3-4 consecutive days during sugarcane anthesis. Males included five commercially released sugarcane varieties, 24 sugarcane breeding lines, two *Erianthus* accessions, one *S. spontaneum* accession, and 13 basic breeding lines. The basic breeding lines included 12 F_1 hybrids between *S. spontaneum* and sugarcane and one BC_2. One polycross was also included in 2008. Pollinated sorghum plants were returned to College Station for seed development and maturation. The sorghum x sugarcane crosses made in College Station were completed using five commercial sugarcane breeding lines from the Texas AgriLife sugarcane breeding

program in Weslaco, TX. Each sorghum panicle was pollinated only one time using the techniques developed in Houma in 2008.

Seed Harvest and Germination: Seed was allowed to develop and mature for 46, 41, and 27 days post pollination in 2007, 2008, and 2009, respectively. Seed from 2007 was stored from 30 to 90 d prior to germination. A high frequency of vivipary was observed in 2007 resulting in a loss of hybrids. To eliminate this problem in 2008 and 2009, seeds were not stored but were immediately germinated. Prior to germination seeds were surface sterilized by soaking them in a liquid suspension of Captan™ and Apron™ (Syngenta, Wilmington, DE) for at least half an hour and then immersing them in a 30% solution of Chlorox™ (Proctor and Gamble, Oakland, CA) bleach for 20 minutes. Following surface sterilization, seeds were rinsed in sterile water and placed embryo side up in a petri dish containing a culture medium of Murashige-Skoog basal salts and vitamins (Murashige and Skoog, 1962) supplemented with 10 mg L^{-1} glycine, 10 mg L^{-1} L-arginine-HCl, 10 mg L^{-1} L-tyrosine, 100 mg L^{-1} inositol, and 30 g L^{-1} sucrose, solidified with 0.7% agar (plant tissue culture grade, Phytotechnology Laboratories, Shawnee Mission, KS) (Sharma, 1999). Petri dishes were maintained between 27 and 30 C under Gro-Lux™ flourescent lights (Sylvania, Danvers, MA) set to 14 hours per day. All seeds that showed good root and shoot development were placed in 4" pots. Once established, they were transferred to the greenhouse.

Confirmation of Intergeneric Hybrid Plants: Intergeneric hybrids were initially classified by morphology. As they developed, all hybrids exhibited numerous characteristics of sugarcane (e.g. height, tillering, and maturity) that the maternal parent did not possess. Plants assumed to be hybrids based on morphology were confirmed

using somatic chromosome numbers. Chromosome spreads were prepared from root tips using a method described by Jewell and Islam-Faridi (1994) with the following modifications. Young actively growing root tips were pretreated with a saturated aqueous solution of α-bromonaphthalene for 2.75 h at room temperature and fixed overnight in 95% ethanol/glacial acetic acid (3:1 v/v). Following fixation, root tips were rinsed several times with distilled water, hydrolyzed for 10 min in 0.2 M HCl and again rinsed in distilled water for 10 min. Cell walls were digested for 35 to 60 minutes at 37 C with an aqueous solution of 5% cellulase (Onozuka R-10, Yakult Honsha Co. Ltd., Tokyo) and 1.0% pectolyase Y-23 (Seishin Corporation, Tokyo) at pH 4.5 and subsequently rinsed three times with distilled water. Meristems were placed on a clean glass slide in an ethanol/glacial acetic acid (3:1) solution, macerated and spread with fine-tipped forceps, air-dried at room temperature for 2 d, and stained with Azure Blue. Root tip spreads were examined using a Zeiss Universal II microscope (Carl Zeiss Inc., Gottingen, Germany) with 63X and 100X apochromat objectives. Images were captured with an Optronics VI-470 system (Optronics Inc., Goleta, CA) and digitally stored and processed with Optimas (v. 6.1) image analysis software (Optimas Corp., Bothell, WA).

Effect of Sugarcane Pollinator on Hybrid Seed Set: For each cross made in Houma in 2008, the sugarcane parent, date of pollination, location of pollination, pollen rating, florets/panicle, seeds/panicle and seedlings produced were recorded. Pollen rating was a subjective measurement determined at the time hybrid seed was harvested by observing the amount of pollen present on stigmas of the sorghum panicle. The amount of pollen present on the stigmas was observed under a dissecting microscope and scored as 1, 2, or

3 with 1 being the least and 3 being the most. For each cross made in College Station in 2009 the sugarcane parent, seeds/panicle and seedlings produced were recorded.

To determine relative effect of location, date of pollination and sugarcane pollinator on seed set and pollen rating, PROC GLM in SAS v9.1 was used. Only sugarcane males that had been used in at least three pollinations were included in the analysis. All effects were considered fixed and only interactions involving the pollinator were included the analysis of variance.

RESULTS

2007 Hybrid Seed Production, Confirmation and Growth: In the fall of 2007, a total of 24 pollinations were made using 17 different pollinators (Table 1). Based on stigma reaction, it was apparent by two to three days post pollination that fertilization had occurred. Seed development was slower and the size was smaller when compared to intraspecific hybridization of sorghum. Embryo loss during seed development, and vivipary after development, became evident when the seed was prepared for germination. Further analysis revealed that these were common problems with 39% of the seed having no embryo, and 32% being viviparous. Seedlings were confirmed as intergeneric hybrids through chromosome counts, and represented a wide range of phenotypes, ranging from very poor in growth to highly vigorous.

From these pollinations, 23 of the most vigorous hybrids were transplanted to pots and placed in the greenhouse. Somatic chromosome counts for these hybrids ranged from 56 to 64 (Fig. 1). These hybrids displayed a wide range of phenotypes but all had numerous long narrow leaves like sugarcane and most tillered profusely. Two hybrids,

L07-9S (Tx3361 x HoCP04-838) and L07-11S (Tx3361 x US06-9025) showed more vigorous growth than the others. In seven months, stalks of hybrid L07-9S were 2.7 m in height and those of L07-11S were 3.1 m (Fig. 1). Unlike Tx3361, both of these hybrids were photoperiod sensitive like sugarcane, and flowered from mid December through January in College Station whereas Tx3361 flowers in approximately 65 d regardless of planting date. The panicles on L07-9S and L07-11S were slightly more compact than those of sugarcane (Fig. 1), and appeared to be male sterile, and attempted backcrossings with the sorghum parent did not produce seed. In August, several stalks of each hybrid were cut to test for the ability to vegetatively propagate and to assess the accumulation of soluble sugars and their distribution. Vegetative propagation through nodal cuttings was successful and internode Brix values ranged from 8.5 to 19% with concentrations increasing with internode maturity as is seen in sugarcane (Whittaker and Botha, 1997).

2008/2009 Hybrid Seed Production and Enhancement of Process: In 2008 a total of 155 sorghum panicles (totaling 74,300 florets) were pollinated. From these pollinations, 10,347 seed were recovered, resulting in an average seed set of 14%. Percent seed set was not measured in the 2009 pollinations, but it appeared similar to that observed in 2008. Seed was harvested 40 d and 28 d post pollination in 2008 and 2009, respectively. Germination rates for the 2008 seed still suffered some from vivipary. In addition it was discovered that many of the embryos could not grow through the seed coat, which further limited germination rates in this year. In 2009 an additional decrease in maturation time further reduced vivipary, and excising the pericarp prior to planting removed the seed coat barrier. These minor modifications significantly improved germination rates from 2.5% in 2007, to 5.7% in 2008, and to a much improved 33% in 2009.

From the combined 2008/2009 pollinations, a total of 1348 seedlings were transplanted to the greenhouse. The phenotypic variation present in these hybrids was extensive, but all were morphologically more like sugarcane than sorghum. These hybrids are expected to follow growth and development patterns observed in the limited set of hybrids evaluated from the 2007 crosses.

Effect of Pollinator Parent on Seed Set and Germination: Analysis of variance detected a significant effect of pollinator parent on seed set (Table 2), indicating that the source of sugarcane pollen is critical in the success of the production of intergeneric hybrids with Tx3361. Tx3361 had good seed set when pollinated with sugarcane clones L06-024, HoCP05-904, Ho06-562 and L01-283 which had seed set rates of 53.0%, 36.0%, 25.2%, and 24.9%, respectively. These pollinators are of particular interest for the production of intergeneric hybrids, while other clones with poor seed set percentages (i.e. <10%) should be avoided (Table 3).

Pollen rating in sugarcane (Table 2) is influenced by genotype and environment, with the date of pollination having a significant effect on pollen shed (Moore and Nuss, 1987). In our study, clones with a low mean pollen rating consistently produced crosses with low seed set, but using clones with a high mean pollen rating did not necessarily produce high seed set. Six of the top seven sugarcane pollinators (defined by seed set percentage) had an average or above average mean pollen rating, while mean pollen ratings in males producing below average seed set varied (Table 3). These results imply that males must not only produce high pollen ratings but that they must also have favorable genetic and/or genomic compatibility with Tx3361.

Analysis of variance of the 2009 data indicated that once the seed was set, neither pollination environment nor sugarcane pollinator influenced percent germination. Based on the current methods of managing seed production and germination, it is reasonable to expect between 25-40% of seed to be viable regardless of which pollinator is used and where the pollination is made.

DISCUSSION

An average seed set of 53% when using sugarcane pollinator L06-024 was unexpectedly high for an intergeneric cross, considering attempts by previous researchers resulted in no more than a few plants (Nair, 1999). The high rate of seed production is attributed to the elimination of pre-fertilization barriers through the use of Tx3361 as well as compatibility of this line with particular sugarcane pollinators. Once produced, management of the hybrid seed prior to germination was critical to maximize production. Marked increases in viable seedlings were observed in each successive crossing year as problems affecting germination were identified. These increases resulted from the elimination of vivipary and physical barriers through early harvest and the removal of the pericarp.

Eliminating hybridization barriers and improving the germination rate has substantially increased the capacity to generate hybrids when compared to previous work. Nair (1999) “thoroughly pollinated” 3,670 florets and produced five seedlings for a success rate of 0.13%. In 2008, 16,813 florets were pollinated using males with a high pollen rating. Of these pollinations, 162 plants were produced for a success rate of 1%. Assuming that “thoroughly pollinated” is equivalent to a high pollen rating, this

represents a 7.7-fold increase in plant recovery between the 2008 crossing season over results reported by Nair (1999). As modifications were made to the seed treatment, an additional 6-fold increase in recoverable progeny was achieved in 2009. Thus, the combined increases resulted in approximately a 40-fold increase in recovered progeny when compared to the previous report.

A limited number of male parents were screened in the current study. It is logical to assume that further screening will uncover additional compatible sugarcane pollinators that will expand production of intergeneric hybrids by increasing seed set and by improving seed quality. Therefore continued screening of *Saccharum* pollinators will be necessary to identify the best males for intergeneric hybrid production. The capacity to produce large-scale quantities of intergeneric *Sorghum*/*Saccharum* hybrids opens a wide range of possibilities for genetic improvement of sugar and bioenergy crops. While successful hybridization between sorghum and sugarcane, *S. spontaneum*, and early generation *Saccharum* hybrids, are described in this study, there is a need to determine the range of germplasm that can be hybridized using the developed lines and techniques. It may be possible to hybridize sorghum with other grasses of the Poaceae (e.g. *Miscanthus*, *Erianthus*, etc.) to facilitate introgression of positive traits among the genera/species.

The genetic and phenotypic variation present among the newly developed *Sorghum*/*Saccharum* hybrids presents significant opportunities. Given the amount of variation present and the large numbers of hybrids produced, segregation is expected to allow for the selection of elite hybrids. Even in 2007, the lowest of the three reported years for seedling production, there was enough variation among the 23 viable seedlings

to select two that were visually superior to the others based on agronomic type. Further characterization of these two selected seedlings, as well as characterization of of future selections is necessary to determine unique strengths and weaknesses of the hybrids.

Selected hybrids can be used to introgress large genomic regions that control valuable quantitative traits from one species to the other. For example, the potential to transfer drought tolerance from sorghum to sugarcane or to introgress enhanced sugar production from sugarcane into sorghum could significantly influence energy and sugar production throughout the world. Because the initial F_1 hybrids did not produce seed when crossed with sorghum, cytological manipulations will likely be needed, but established procedures provide approaches to mitigate this obstacle (Kuhlman et al., 2008).

If the F_1 hybrids possess unique and desirable agronomic characteristics and they perform well in agronomic trials, there is the potential to develop a new intergeneric hybrid crop. For example, a “sorcane” hybrid with high sugar accumulating capacity and enhanced water-use efficiency may be valuable as either a seed or vegetatively propagated crop. Additional research and development on sorghum seed parents and sugarcane pollinators must be completed to maximize seed production and development to make seed propagation a viable option. However, the germplasm and techniques described will produce seed quantities suitable for introgression, selection, and testing purposes.

REFERENCES

Al-Janabi, S.M., M. McClelland, C. Petersen, and B.W.S. Sobral. 1994. Phylogenetic analysis of organellar DNA sequences in the Andropogoneae: Saccharinae. Theor. Appl. Genet. 88:933-944.

Bourne, B.A. 1935. A comparative study of certain morphological characters of sugarcane x sorgo hybrids. J. Agric. Res. 50:539-552.

Burner, D.M., T.L. Tew, J.J. Harvey, and D.P. Belesky. 2009. Dry matter partitioning and quality of *Miscanthus, Panicum,* and *Saccharum* genotypes in Arkansas, USA. Biomass and Bioenergy. 33:610-619.

Clark, J.W., E.J. Soltes and F.R. Miller. 1981. Sorghum – A versatile, multi-purpose biomass crop. Biosources Digest. 3:36-57.

De Wet, J.M.J., S. C. Gupta, J. R. Harlan and C. O. Grassl. 1976. Cytogenetics of introgression from *Saccharum* into *Sorghum*. Crop Science 16:568-572.

Goldemberg, J. 2007. Ethanol for a sustainable energy future. Science 315:808-810.

Guimarães, C.T., G.R. Sills and B.W.S. Sobral. 1997. Comparative mapping of Andropogoneae: *Saccharum* L. (sugarcane) and its relation to sorghum and maize. Proc. Natl. Acad. Sci. 94:14261-14266.

Hodnett, G.L., B. L. Burson, W. L. Rooney, S. L. Dillon, and H. J. Price. 2005. Pollen-pistil interactions result in reproductive isolation between *Sorghum bicolor* and divergent Sorghum species. Crop Science 45:1403-1409.

Jewell, D.C., and M.N. Islam-Faridi. 1994. Details of a technique for somatic chromosome preparation and C-banding of maize. p. 484–493 *In* M. Freeling and V. Walbot (ed.) The Maize Handbook. Springer-Verlag, New York.

Kuhlman, L.C., B.L. Burson, P.E. Klein, R.R. Klein, D.M. Stelly, H.J. Price, and W.L. Rooney. 2008. Genetic recombination in *Sorghum bicolor* x *S. macrospermum* interspecific hybrids. Genome 51:749-756.

Kulman et al., in review

Laurie, D.A. and M.D. Bennett. 1989. Genetic variation in sorghum for the inhibition of maize pollen tube growth. Ann. Bot. 64:675-681.

Lipinsky, E. S. 1978. Fuels from biomass: Integration with food and materials systems. Science 199:644-651.

Moore, P.H. and K.J. Nuss. 1987. Flowering and flower synchronization. p. 273-311. *In* D. J. Heinz (ed.) Sugarcane improvement through breeding. Elsevier Science Publishing Co. Inc., New York,

Moriya, A. 1940. Contributions to the cytology of genus *Saccharum* I. Observations on the F_1 progeny of sugar cane-sorghum hybrids. Cytologia 11:117-135.

Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bio assays with tobacco tissue cultures. Physiol. Plant. 15:473-497.

Nair, N.V. 1999. Production and cyto-morphological analysis of intergeneric hybrids of *Sorghum* x *Saccharum*. Euphytica 108:187-191.

Perlack, R.D., L.L. Wright, A.F. Turhollow, R.L. Graham, B.J. Stokes, and D.C. Erbach. 2005. Biomass as feedstock for a bioenergy and bioproducts industry: The technical feasibility of a billion-ton annual supply. DOE/USDA. http://www.osti.gov/bridge

Price, H.J., G.L. Hodnett, B.L. Burson, S.L. Dillon, D.M. Stelly, and W.L. Rooney. 2006. Genotype dependent interspecific hybridization of *Sorghum bicolor*. Crop Science 46:2617-2622.

Sharma, H.C. 1999. Embryo rescue following wide crosses. P. 293-307. *In* R. H. Hall (ed.) Plant cell culture protocols. Methods in molecular biology. Vol. III. Humana Press Inc., Totowa, NJ.

Venkatraman, R.B.T.S. and R. Thomas. 1932. Sugarcane-sorghum hybrids. Part I. General outline and early characters. Ind. J. Agric. Sci. 2:19-27.

Whittaker, A. and F.C. Botha. 1997. Carbon partitioning during sucrose accumulation in sugarcane internodal tissue. Plant Physiol. 115:1651-1659.

Table 1. Sugarcane parents used in the sorghum x sugarcane crosses listed by year and location of cross. Number of panicles pollinated, number of seed produced and number of seedlings grown are listed by pollinator. Male parents are described by generation as released energy cane (REC), commercial breeding line (CBL), released sugarcane (RSC), *S. spontaneum* (spontaneum), *Erianthus*, F_1, BC_1, BC_2, or polycross. Total florets were counted in 2008.

Male	Generation	Panicles	Florets	Seed	Seedlings
		Houma 2007			
Ho 00-961	REC	1		4	1
HoCP 01-517	CBL	1		8	1
HoCP 04-838	CBL	1		59	2
HoCP 96-540	RSC	1		46	2
MPTH 97-003	spontaneum	1		29	
MPTH 97-107	spontaneum	1		0	
MPTH 97-194	Erianthus	2		8	
MPTH 97-218	spontaneum	1		13	
MPTH 98-388	spontaneum	1		0	
Polycross	Polycross	3		69	3
US 03-145	spontaneum complex	1		0	
US 03-165	F_1	2		525	1
US 03-177	F_1	2		210	1
Ho 06-9014	BC_2	2		359	
Ho 06-9017	BC_1	1		1	
Ho 06-9025	CBL	1		152	12
US 72-114	BC_1	2		21	
Total		24		1504	23
		Houma 2008			
Erianthus		1	544	0	0
HB03-364	F_1	1	329	63	0
HB03-403	F_1	5	2,025	256	0
Ho 01-564	CBL	5	3,275	334	16
Ho 05-961	CBL	23	8,976	1,691	160
Ho 06-525	CBL	6	2,765	301	19
Ho 06-530	CBL	1	975	0	0

Ho 06-543	CBL	2	592	9	1
Ho 06-552	CBL	2	978	10	0
Ho 06-562	CBL	4	1,725	480	13
Ho 06-563	CBL	1	281	85	3
Ho 06-565	CBL	2	408	199	0
Ho 07-613	CBL	2	1,131	316	1
Ho 95-988	RSC	1	760	43	0
HoCP 01-517	CBL	5	2,506	217	14
HoCP 04-803	CBL	1	393	19	1
HoCP 04-810	CBL	2	1,120	10	0
HoCP 04-838	CBL	8	5,152	603	91
HoCP 05-903	CBL	2	894	72	0
HoCP 05-904	CBL	3	2,074	581	34
HoCP 05-923	CBL	3	951	4	2
HoCP 06-502	CBL	1	159	13	0
HoCP 96-540	RSC	11	6,934	929	86
HoL 05-953	CBL	1	240	22	0
L 01-283	RSC	9	4,972	1,301	36
L 06-001	CBL	1	795	31	3
L 06-024	CBL	3	1,260	669	40
L 06-38	CBL	2	872	32	0
L 99-226	RSC	2	592	5	1
L 99-266	CBL	1	475	90	21
LCP 85-384	RSC	3	1,937	145	11
MPTH 97-209	spontaneum	5	2,401	195	3
MPTH 97-260	Erianthus	2	1,049	6	0
NG 77-214	Erianthus	1	433	0	0
Polycross	Polycross	2	125	93	1
US 02-840	CBL	1	557	2	0
Ho 07-9002	F_1	1	532	156	2
Ho 07-9005	BC_2	2	1,029	391	2
Ho 07-9014	F_1	7	3,761	204	25
Ho 07-9016	F_1	1	588	0	0
Ho 07-9017	F_1	2	516	1	0
Ho 07-9018	F_1	1	253	1	0
Ho 07-9019	F_1	2	742	271	1
Ho 07-9020	F_1	2	1,030	108	0
Ho 07-9023	F_1	2	1,713	359	3
Ho 07-9025	F_1	3	1,160	9	0
Ho 07-9026	F_1	7	2,764	21	2
Total		155	74,743	10,347	592

		Texas 2009			
TCP 00-4521	CBL	16		28	9
TCP 01-4535	CBL	7		66	32
TCP 02-4622	CBL	11		362	128
TCP 03-4636	CBL	30		1,651	519
TCP 03-4645	CBL	9		203	68
Total		73		2,310	756
Grand Total		252	74,743	14,161	1371

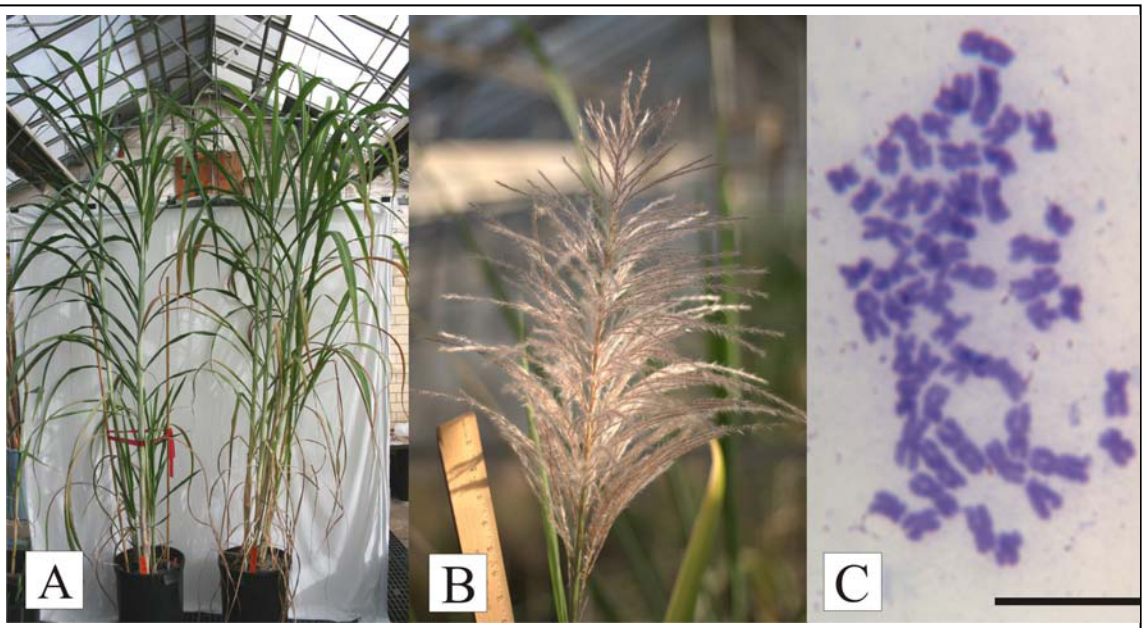
Table 2. Analysis of variance for seed set and pollen rating for seventeen sugarcane pollinators used to pollinate Tx3361 in Houma, La in the fall of 2008.

	Seed Set			Pollen Rating		
Source	df	MS	Pr>F	df	MS	Pr>F
Location	3	0.031	0.216	3	0.655	0.093
Date(Location)	14	0.025	0.283	15	0.631	0.019
Male	16	0.047	0.010	16	0.877	0.001
Male*Location	10	0.022	0.381	10	0.285	0.474
Male*Date(Location)	8	0.031	0.167	9	0.739	0.016
Error						

Table 3. Number of pollinations, Percent seed set on Tx3361 and mean pollinator pollen rating for 17 different sugarcane cultivars and/or breeding lines in the fall of 2008 in Houma, La. Only pollinators that were used in at least three pollinations were included in this analysis. Pollen rating for each panicle was 1 (low), 2 (medium) or 3 (high).

Saccharum Pollinator	Pollinations	Seed set	Pollen Rating
	-----no.-----	---%---	
L 06-024	3	53.0	2.33
HoCP 05-904	3	36.0	2.67
Ho 06-562	4	25.2	2.50
L 01-283	9	24.9	2.00
Ho 05-961	23	18.2	1.65
HB03-403	5	15.6	1.80
HoCP 04-838	8	15.3	2.10
HoCP 96-540	11	13.6	1.64
HoCP 01-517	5	10.1	1.40
Ho 01-564	5	8.9	1.40
Ho 06-525	5	8.6	1.80
MPTH97-209	4	8.2	2.00
LCP85-384	3	7.5	3.00
Ho 07-9014	7	5.7	1.86
Ho 07-9026	7	0.7	1.00
Ho 07-9025	3	0.6	1.67
HoCP 05-923	3	0.4	1.00
Mean		14.8	1.80
L.S.D.		18.5	0.70

Figure 1. Photographs of sorghum x sugarcane intergeneric hybrids grown in College Station, Texas. (A) Two seven month old sorghum x sugarcane hybrids; (B) An inflorescence of a sorghum x sugarcane hybrid; and (C) mitotic chromosome spread from a sorghum x sugarcane hybrid. Scale bar = 10 µm.



From:	Yolanda Eliette Palacio
To:	wlr@neo.tamu.edu; Bill Rooney; Lloyd Rooney; Vilma Ruth Calderon; Vilma Ruth Calderon de Zacatares
Subject:	PCCMCA
Date:	Monday, August 24, 2009 1:02:28 PM
Attachments:	YOLANDA ELIETTE PALACIO.pdf YOLANDA ELIETTE PALACIO-2.pdf

---

Hi Dr. Bill: I am sending you my acceptation letter from PCCMCA. I am asking if you can support me with the funds to go to PCCMCA and talk to my boss Ing. Ma. Isabel Martinez (505)2278-0469 is the direction telephone. Excuse me because I am asking this favor, but I think is important for INTSORMIL and me to consider this opportunity that PCCMCA corganizators have selected my two works.

Thank you for your help.

regards

Eliette

--
Ing.Eliette Palacio
Investigadora Zonal Programa Sorgo
INTA-Pacífico Norte
Tel. Oficina:(505)23115446
Tel. Cell: (505)83360829

55 Reunión Anual de la Sociedad del PCCMCA 2009

PROGRAMA COOPERATIVO CENTROAMERICANO PARA EL MEJORAMIENTO DE CULTIVOS Y ANIMALES

07 de agosto de 2009

Estimado (a):

Yolanda Eliette Palacio

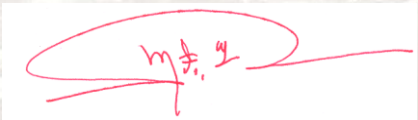
Reciba un atento y cordial saludo de parte del **Comité Organizador de la 55 Reunión Anual del PCCMCA**, y de la comisión técnica, deseándole éxitos en sus labores profesionales.

Por este medio tenemos el agrado de informar a usted que el resumen de su trabajo titulado:

EVALUACIÓN DE VIDA ÚTIL DE LAS HARINAS DE GRANO ENTERO DE SORGO [*Sorghum bicolor* (L.) Moench]

Ha sido **aprobado** por la Comisión Técnica y programado para su presentación en forma **Oral.**

ATENTAMENTE



Ph. D. Noé Montes García
Co-Coordinador Mesa de Arroz y Sorgo
PCCMCA 2009

San Francisco de Campeche, México.
7 al 11 de septiembre

55 Reunión Anual de la Sociedad del PCCMCA 2009

PROGRAMA COOPERATIVO CENTROAMERICANO PARA EL MEJORAMIENTO DE CULTIVOS Y ANIMALES

07 de agosto de 2009

Estimado (a):

Yolanda Eliette Palacio

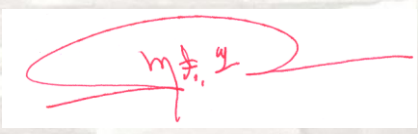
Reciba un atento y cordial saludo de parte del **Comité Organizador de la 55 Reunión Anual del PCCMCA**, y de la comisión técnica, deseándole éxitos en sus labores profesionales.

Por este medio tenemos el agrado de informar a usted que el resumen de su trabajo titulado:

CARACTERIZACIÓN FÍSICA Y NUTRICIONAL DE HARINAS DE SORGOS [*Sorghum bicolor* (L.) Moench] MEJORADOS Y CRIOLLOS CULTIVADOS EN DISTINTAS ZONAS DE NICARAGUA

Ha sido **aprobado** por la Comisión Técnica y programado para su presentación en forma **Oral.**

ATENTAMENTE



Ph. D. Noé Montes García
Co-Coordinador Mesa de Arroz y Sorgo
PCCMCA 2009

San Francisco de Campeche, México.
7 al 11 de septiembre

From:	Sonnie Feagley
To:	Anna J Fox; Daniel Hathcoat; Amir M Ibrahim; Bryan E Simoneaux; Charles Fontanier; Cristine L Morgan; Chantel Scheuring; David Baltensperger; Dirk Hays; Dennis L. Coker; Dawn Deno; Don Vietor; David Zuberer; Garrett Norman; Gaylon Morgan; Heidi J Mjelde; Joseph M Awika; Joe Cothren; Jerri Hamar; Jacqueline Peterson; Jim Thomas; Jason P Wight; John W Smith; Kathy Ferguson; Kerry Mayfield; Kristen Richardson; Michael R Baring; Nino Brown; Russell W Jessup; Richard H Loeppert; Racey Padilla; Robert Myatt; Scott A Finlayson; Staci Frerich; Steve Haque; Seth C Murray; Terry J Gentry; Travis W Janak; Vanessa Corriher; Vickie Marriott; Vince A Saladino; Wayne Thompson; Youjun Deng; Al N Nelson; Dennis R Pietsch; C. Wayne Smith; Dan Fromme; Dale A Mott; Dwaine Raska; Delroy Collins; Frank Hons; Glenda Kurten; James L Heilman; Jim J Heitholt; Mike Chandler; Kathy Schmitt; Linda Carpenter; Linda Francis; Larry Redmon; Mark L McFarland; Paul A Baumann; Pamela Littlejohn; Russell Sutton; Richard White; Sam Feagley; Scott Senseman; Stephen Labar; David M Stelly; Tami Hons; Todd Baughman; Travis Miller; Bill L Rooney; Dustin Borden
Subject:	PDF Form of Purchasing Card Information
Date:	Tuesday, October 27, 2009 11:32:08 AM
Attachments:	Purchasing Card Procedures.pdf
Importance:	High

** High Priority **

Attached is a pdf version of the Purchasing Card Information.

Sorry for all the confusion.

Please let me know if you have any questions.

Thanks.
Sonnie

DO IT RIGHT, STAY OUT OF SIGHT AND KEEP US QUIET

OR.....How to keep your purchasing card!

Tips to help us help you purchase the easy way with your Purchasing Card

- **TURN ALL INVOICES IN EACH FRIDAY**. Include the account number the expense is to be charged against.

- Invoices smaller than 8 ½ X 11 should be glued or taped (DO NOT TAPE OVER ANY PRINT) on an 8 ½ X 11 sheet of paper. Do not overlap any invoices. If an invoice such as a register tape is longer than 8 ½ X 11, you may cut the invoice and tape it side by side.
  The statements and receipts are scanned each month.

- If the description on the invoice/receipt is not clear, in layman's terms, **WRITE THE DESCRIPTION BY EACH ITEM**.

- **WHEN PURCHASING ITEMS FOR EQUIPMENT**, such as oil filter, oil, replacement parts, etc., state what equipment the items are for (tractor, planter, etc.).

- If there is water, gatorade, ice, etc. purchased for field work and if food, water, etc. is purchased for a meeting, seminar, etc., you need to **LIST THE 5 W'S**: what, when, where, who, why; what was purchased, when it will be consumed, where it will be consumed, who will consume it and why will it be consumed. If you purchase a **business meal**, we need the **itemized receipt, charge card receipt and the 5'W**.

- Your statement will be scanned and e-mailed to you each month, please approve the statement either by responding to the e-mail or printing, signing and **SUBMITTING IT TO SONNIE WITHIN FIVE BUSINESS DAYS.**

- **WATCH FOR TAX BEING CHARGED.** Correct it immediately or you will have to go back to the merchant and get it done. We cannot pay taxes.

- **USE A HUB VENDOR!** It still counts for or against us when they review our spending even when we are reimbursing an employee they look at the vendor you used.

- **Effective immediately, if we request a missing receipt and it is not received within three business days, or we are not contacted if there is problem, this will be considered a warning. Three warnings will result in a one month suspension of your Purchasing Card.**

- **WE APPRECIATE ALL OF YOUR HELP.** When everything is included as required by the state, then it saves the department from audit findings and we are able to perform our jobs in a much more efficient manner.

NOTE: Remember that accounts for pro-card usage are exclusive to agency. Research, Extension and Teaching cards must be used for the appropriate account charges... ie, 06 accounts reallocated to a research card, 07 accounts to an extension card and 02 accounts to teaching card.