Mission:

To prepare students with professional expertise leading to successful careers in business, government, and vocational institutions while experiencing fulfilled lives and meeting mature responsibilities in a constantly changing society; and to be a source of agricultural knowledge that is obtained through study and research that may be utilized for the improvement of the quality of citizens of the United States.
Enrollment Management:

The William H. Darr School of Agriculture at Missouri State University is comprised of nine academic majors, seven minors and three Master of Science programs. With the new designation as a School, Agriculture at Missouri State is pushing forward with a number of changes both academically and in facilities. Recently, the majors of Horticulture and Agronomy were revised, updated and renamed Environmental Plant Science and Natural Resources. The designation of these majors more accurately reflects the newly incorporated focus on sustainability and science. A comprehensive assessment plan for all majors within the School is currently being development for immediate implementation. One assessment measure currently in place is accreditation through Department of Elementary and Secondary Education for the Agricultural Education program. In Fall 2011 the program received full accreditation.

The School continues to see positive growth, both in the number of students enrolled and credit hours generated. The initial numbers for Fall 2012 look promising to continue this upward trend.

Registration Summary for School of Agriculture

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Credit Hours by Program of Study Fall 2009-Spring 2012

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Undergraduate graduation rates remain stable.

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[4]
The largest growth in graduation rates is in the graduate program. As this program continues to develop and expand, we can expect this trend to continue.

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Facilities:

In addition to expanding student enrollment, the School of Agriculture is also spatially expanding with the addition of the Christopher S. Bond Learning Center at the Darr Agricultural Center (DAC) located on Kansas Expressway. In Spring 2012, 11 courses were taught at the Bond Learning Center and 8 were taught at Pinegar Arena for a total of 263 students per week at the DAC. In the Fall of 2012, 8 courses will be taught at the Bond Learning Center and 6 courses at Pinegar Arena for a tentative total of 296 students as of July 10th.

Numerous community, business and student groups have toured the Bond Learning Center and DAC facilities this year, including Senator Roy Blunt, Congressman Billy Long, Congresswoman Vicky Hartzler, the Missouri Beef Industry Council, FCS Financial, TRiO Upward Bound, the Missouri State Board of Governors, and the Missouri State Foundation. The Center has also hosted a number of educational events. The following serves as an incomplete list of the educational and recruitment events held at the Center in the past year. Additional events are listed under the service and outreach section.

- **New Student Mixer:** Sept 1, 50 attendees
  - Incoming freshmen and transfer students attend a presentation to introduce them to our student organizations and faculty.

- **Ag Picnic:** Sept. 8, 100 attendees
  - Students and faculty held a picnic at the new Bond Learning Center. An update on the state of the School is given and each student organization is given a chance to introduce their membership and announce their first meeting date. The event serves as a way to increase interaction between faculty and students.

- **School of Agriculture Scholarship Banquet:** Nov. 2, 450 attendees
  - Faculty and friends of the School of Agriculture come together each year to honor scholarship recipients. This year 78 students received scholarships totaling $43,780.

- **Southwest Missouri FFA Public Speaking Contests:** Nov. 10, 70 attendees
  - 48 different students competed in six different agriculture related public speaking events which identified winners who advanced to state competition.

- **Ag Expo:** Nov. 11, 50 attendees
• High school Juniors and Seniors spent the day touring Karls Hall and DAC. They heard presentations from current students enrolled in the Leadership Class who also planned the event.

• Salute to Agriculture Picnic and Basketball Game: December 19, 500 attendees
  o FFA chapters from across the state attended the School of Agriculture/Missouri Farm Bureau sponsored activity which included a BBQ luncheon and Ag Olympics conducted at the Darr Center and the MSU Basketball Game that evening.

• SW MVATA District Teachers Meeting: January 10, 90 attendees
  o The Bond Center hosted and fed SW district teachers for their annual winter meeting.

• 4-H Small Ruminant Camp: Feb 11, 140 attendees.
  o Participants attended a variety of workshops dedicated to sheep and goat care including proper care of hooves, soap making and ethical issues involved in livestock showing.

• Grow Local! Production and Marketing Workshop: Feb 18, 75 attendees.
  o Participants heard from a variety of speakers about the opportunities that exist from direct local marketing in the Greater Springfield area. Curtis Millsap of Millsap Farms, shared his experiences capturing added value through local marketing and the unique opportunities and challenges he has faced in his journey. Purchasing managers from HyVee were also present to present details on getting local produce on HyVee shelves.

• FFA Horse Judging Clinic: Mar. 12, 200 attendees
  o High school FFA students attended a workshop to learn the basics of horse judging. At the clinic they had an opportunity to put these skills to use in preparation for District FFA Contest held in April.

• Missouri Agribusiness Academy Interviews: March 20, 10 high school sophomores and their parents or teachers
  o MSU ag staff and community ag leaders interviewed this elite group of sophomores who became eligible to participate in the Missouri Agribusiness Academy conducted in conjunction with the Missouri Department of Agriculture.

• District Ag Education Career Development Events: Mar. 31, April 2 & 3, almost 2000 high school students
  o The SW District CDE’s competitions are conducted and judged by School of Agriculture faculty and staff and hosted in the various ag facilities.

• Transfer Student Expo: Apr. 12, 20 attendees
  o Potential transfer students from community colleges we invited to tour Karls Hall, DAC and Journagan Ranch. The event was hosted by the Advanced Leadership Class and introduced students to the School of Agriculture.

• Missouri Beef Industry Show Me Series: Cattle Theft Prevention Workshop: May 15, 150 attendees.
  o Participants heard from a number of speakers on issues regarding cattle theft including prevention, what to do in the case of cattle theft and current steps being taken by the Highway Patrol and livestock auction houses to prevent cattle theft.

• FFA Camp: May-June, 1200 attendees
Students from the Advanced Leadership class traveled to FFA Camp to present information on MSU ag programs. Students from across the state of Missouri participated in an hour long presentation on the School.

- Induction 1<sup>st</sup> and 2<sup>nd</sup> Year Ag Ed Instructor Workshops: July 23, 75 attendees
  - 1<sup>st</sup> and 2<sup>nd</sup> year teachers from across the state met for their first teacher training workshops better preparing them for their upcoming careers as secondary ag teachers.

- Missouri Vocational Ag Teacher’s Conference Workshops: July 25, 100 attendees
  - Ag teacher workshops were conducted at the Darr Center in conjunction with State Vocational Conference also held in Springfield.

Programs are also expanding at the School’s other facilities. As the Journagan Ranch program continues to develop, hands-on learning opportunities will increase for students. Last summer the Ranch employed a full-time intern to experience working on a cattle ranch. Upper level animal science students had the opportunity to travel to the Ranch to assist with calving season this spring. Students were housed at the Mountain Grove dormitories for the weekend and spent many hours in the field assisting with the calving process. This summer four students spent six weeks and two students spent two weeks each interning at the Ranch. Numerous outside visitors have also had the chance to tour the ranch including Senator Roy Blunt, Congresswoman Jo Ann Emerson, the Missouri Beef Industry Council, student organizations and alumni organizations. This past year, the first trail ride of the Ranch was held with the proceeds benefiting scholarships within the School of Agriculture. The event attracted nearly 24 riders despite the rain and raised $2200. The 2012 Ride is currently scheduled for September 22<sup>nd</sup>.

Likewise programs at the Fruit Experiment Station also continue to thrive. The Station at Mountain Grove continues to host a multitude of continuing education courses and workshops for area producers. The complete list of the workshops and courses offered last year are listed at the end of this review under service and outreach.

- Spraying and Pruning Home Fruit Crops: March 3, 44 attendees
  - Participants were able to learn valuable information including which spray materials are appropriate for fruit crop production, the proper time to spray and demonstrations on safety equipment and pruning practices. Additionally, staff and faculty from the William H. Darr School of Agriculture provided small, guided hands-on training.

- Distillation Workshop: March 7, 12 attendees.
  - Following a morning lecture on the distillation process, attendees participated in the distillation of Chambourcin to experience the process and sensory evaluation of the product. This particular workshop was so popular that a second date on March 13<sup>th</sup> was scheduled with an additional 12 attendees.

- Food Safety Workshop: March 22, 112 attendees
  - At this workshop, participants learned about a variety of topics including what is food safety, the importance of food safety, state regulations for selling to the public, food safety concerns in the field, field preparation and planting, manure usage and crop cultural guidelines, irrigation methods and associated issues, harvest and post-harvest safety, food safety from the field to the market, and Good Agricultural Practices (GAP) on the farm.
- High Tunnel Open House: June 6, 82 attendees.
  - Attendees to this workshop got the opportunity to experience a high tunnel first hand. Staff were on site to answer questions and give tours of the high tunnel including the solar powered automated side curtain venting system.

In addition to the students working at the Journagan Ranch, students also interned at Mountain Grove. The students were housed in the dormitory area at Mountain Grove which was recently renovated at a cost of $150,000. The winery located at the Station, Mountain Grove Cellars was remodeled and updated at a cost of $200,000. The Cellar continues to produce award-winning wines. In 2011 alone, Missouri State wines won 18 awards; one double gold, one sweepstake nominee gold, one gold, nine silver, and six bronze with one Best of Show award (blush or rose) and the distillery received a bronze medal for its first commercial release with the Peach Brandy. During the 2011 harvest season, 1,660 gallons of wine and 180 gallons of apple wine (for distillation) were produced. The Missouri State University Winery had over $29,472 in sales last year.

The equine program has also experienced positive growth in the last year with the donation of seven horses into the program. As of January 1, 2012 the School of Agriculture owned 36 horses with 31 currently housed at DAC. Of these 28 are regularly used in the instructional herd. Records of horse use for 2011 indicate that horses are used between 0 and 46 times per month depending on the horse and horses are used between 1 and 42 times during each day classes are in session, with an average of between 20 and 31 per day depending upon the month.

The beef cattle program is expanding as well. With the addition of the Journagan Ranch there are currently 407 cow/calf pairs, 25 bred cows, 64 heifers and 36 bulls in the program. Over the past couple of years 624 head of cattle have been donated. In October 2010 and October 2011 cattle sales were held at Pinegar Arena where buyers came from all over the United States. Our student organizations were involved with sale preparation and assisted on the day of the sale. Preparation is currently in progress for the next cattle sale on October 6th.

There are currently no cattle at Baker’s Acres and 15 head at DAC. These cattle are used primarily for classwork and interaction with the public. Including shows and special presentations the cattle spend about 50 days a year working with the general public and tour groups to DAC. This year at the Ozark Empire Fair, Laramie, a two year old bull in the program, won Reserve Grand Champion Bull. At the Missouri State Fair the show cattle collectively won a champion, a reserve champion, a reserve grand champion, 1st two year old bull, and reserve champion cow/calf pair. In terms of student use, the cattle are used approximately 25 days per year in interactions with students. Four of the cattle currently at DAC are cannulated. These four steers were used last year for a three-month period in faculty research.

Faculty and Staff:

Within the School there are currently 4 full professors, 10 associate professors, 1 senior instructor, 2 instructors and 11 per course instructors. One professor retired this year, Dr. Jon Wiggins. Dr. Wiggins will return to the School as a per course instructor. Ramona Taylor, administrative assistant, also retired but will return to the School on a part time basis. The School filled two new positions this past year as well. The first is an instructor in Agricultural
Business and also serves as the new Outreach Coordinator. In this position, Mrs. Christine Sudbrock will teach AGB 144 and coordinate activities at the Bond Learning Center and many outreach opportunities. The second position filled was the Business Services Coordinator. In this position, Mr. Mike Klem is responsible for the management and long-range goals of the numerous facilities under the School of Agriculture. Faculty within the school advise on average approximately 30 students and the majority also advise at least one student organization.

Based on self-provided information from Digital Measures, faculty at MSU have had 39 publications in peer-reviewed journals since 2009. Additionally, they have presented over 38 oral presentations and have had 7 poster presentations at local, regional, national and international meetings over the past year.

Results from the Delaware Study have found that our tenure track faculty are making strides in efficiency. A rating of 100 or higher indicates that faculty are more efficient than faculty in the programs they are being compared to.

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</tr>
<tr>
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<td>All Faculty</td>
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Access:

Faculty are embracing new technologies in the classroom to enhance the learning opportunities of students at Missouri State. Popular computer programs such as PowerPoint and Blackboard and innovative technologies such as ITV and Internet courses are being utilized. Courses delivered via ITV and the Internet are continually being expanded to increase student access. Professors are incorporating additional technologies such as IPADs and tablets into classroom learning. The latest technology being employed into MSU curriculum is Mediasite, lecture capture. This technology allows a faculty member to video the lecture as it’s being delivered including PowerPoint, DVD, tablet illustrations, etc. Along with being an invaluable tool for students required to travel, this technology has exciting implications for use in distance learning, Internet courses and dual credit. The School hopes to expand dual credit offerings to high school students through the use of lecture capture.

External Funding:

Between the School of Agriculture, the Center for Grapevine Biotechnology and the VESTA program numerous grants and external funding sources have been secured for programs within the School. Grants awarded from 2010 to the present are presented in the following tables.
## Grants Awarded

### FY 2012 Awarded Funding

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<td>$1,303,627</td>
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<td>12113</td>
<td>Pszczolkowski, M</td>
<td>AGR</td>
<td>Herb Society of America</td>
<td>A Green Alternative to an Organophosphate Neurotoxin: Preventing Apple Infestation by Codling Moth with Extracts</td>
<td>$4,999</td>
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### Center for Grapevine Biotechnology

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<tr>
<th>SRP#</th>
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<td>09219</td>
<td>Qiu, W</td>
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<td>The Midwest Grapevine Tissue-Culture and Virus Testing Laboratory: Sustainable Phase</td>
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<td>11092</td>
<td>Hwang, C</td>
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<td>U.S. Department of Agriculture via Cornell</td>
<td>Accelerating Grape Cultivar Improvement via Phenotyping Centers and Next Generation Markers</td>
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### FY 2011 Awarded Funding

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<td>USDA via Missouri Department of Agriculture via Columbia</td>
<td>Advancement of American Elderberry as a Missouri Special Crop by Elucidating its Pest and Disease Complex</td>
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<td>Missouri Agriculture and Small Business Development Authority via Missouri Enterprise</td>
<td>Feasibility Study of Establishing a Dairy Processing Plan in Mountain Grove Area</td>
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### Center for Grapevine Biotechnology

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**FY 2010 Awarded Funding**

### Agriculture

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### Center for grapevine Biotechnology

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<td>U.S. Department of Agriculture-Viticulture Consortium/East Section</td>
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### Missouri Viticulture and Enology Center

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<td>MVEC</td>
<td>National Science Foundation</td>
<td>VESTA</td>
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In addition to these funds, two grants for the USDA’s Capacity Building Grants for Non Land Grant Colleges of Agriculture (NLGCA) Program were recently submitted. The first titled Building Research and Education Capacity for Improving the Grape Breeding Program and Plant Genetics Curriculum, aims to build a cooperative and comprehensive program between Missouri State University and Truman State University to enhance research and educational capacity for a grape breeding program and plant genetics curriculum. The second, titled Linking to Focus on Agriculture Sustainability & Food Security (LFASFS), aims to collaborate with Northwest Missouri State University and the University of Central Missouri to increase awareness among students studying agriculture about the importance of sustainability and food security and to develop the skills necessary to become effective leaders and advocates while engaging the general public and those from urban settings. Additionally, a grant to expand the current Pathways Program to include additional courses in animal science and
agricultural business was submitted. The Pathways Program is aimed at providing an easy and seamless transition from a two-year institution to a university such as Missouri State.

Gifts:

The School has been very fortunate that along with the current budget and grant funding, a number of generous donors have made both monetary and in-kind gifts to assist with research, student development and various projects. Over the past three years, cash donations have increased 77.4%

<table>
<thead>
<tr>
<th>Year</th>
<th>Gift Income - Cash</th>
<th>Gift income - In Kind</th>
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<tr>
<td>FY12</td>
<td>$452,340</td>
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</table>

In-kind donations range from laboratory equipment, to plant products, to feed, to tack and livestock. In the past year 7 horses were donated as well as 624 cattle. With the continued support of our generous donors, 2012 and the coming years look to be an exciting time for the School of Agriculture.

Research:

Faculty are also pushing the limits of innovation in the area of research. The many and varied research projects currently being carried out at the DAC, the Fruit Experiment Station and Journagan Ranch further enhance the knowledge of the scientific community, aid producers around the world and enrich the learning experience of students studying at Missouri State University. The following highlights some of the current research projects.

- Molecular Genetic Support to Optimize the Breeding of Root-Knot Nematode Resistant Rootstocks
- Feeding deterrents to prevent fruit infestation by codling moth
- Optimizing a lure and trap, and prototyping a killing station against green June beetle
- Analyzed microarray data of Norton berry skin development obtained by using Affymetrix GeneChip
- Discovery of a new DNA virus and its association with vine decline in grapevines in Missouri
- The sequencing and bioinformatics analysis of the Norton genome
- Aging of red wines made from non-vinifera grapes
- Color stability of Norton wine as it is effected by the concentrations of anthocyanins and tannin
- Effect of winemaking treatments on the polymeric pigment and tannin content of Norton and Chambourcin wine
- Effect of sulfur dioxide levels on the color stability of a low tannin wine (Chambourcin)
In addition to the current research projects being conducted within the School, future research promises to attract some of the best and brightest minds throughout the country. The following highlights some future research initiatives.

- Expand the existing mapping population of \( V. \text{aestivalis} \) ‘Norton’ \( \times V. \text{vinifera} \) ‘Cabernet Sauvignon’ from 75 to 500 genotypes for fine linkage map construction
- Initiate the construction of a Norton genetic linkage map based on SSR markers
- Initiate the Botrytis resistance assay on the existing 100 \( F_1 \) progenies
- Assist in the evaluation of existing Norton-Cabernet Sauvignon \( F_1 \) population for adaptability, productivity and winemaking quality as well as select appropriate plants for backcrosses
- Build a mathematical day-degree model for forecasting green June beetle outbreaks
- Continue and expand studies on insect reproduction, taste and odor perception with use of video, electrophysiology and fluorescent microscopy
- Grazing and the effects on the soil, the pasture, and animal performance
- Basic meat goat production and feeding programs which effect productivity, including carcass traits and palatability
- Effects of fescue ingestion on thermoregulation in horses

Awards:

Students enrolled in the School of Agriculture continue to be high achieving both in academics and in leadership positions. The following is an incomplete list of students’ accomplishments.

- **Alison Bos**
  - 2011-2012 Citizen Scholar
  - Semi-Finalist in Advanced Horsemanship
  - President Horseman’s Association

- **Durrell Dixon**
  - High point four year old and older division NEO Colt Show
  - High Point Overall NEO Colt Show

- **Casteel Kirk**
  - National Delta Tau Alpha Honor Society President
  - 2nd place team in National Delta Tau Alpha Quiz Bowl Competition

- **Bethany Markway**
  - 2012-2013 Teach Ag Ambassador
  - Participant National Ag Day in Washington D.C.
  - Participant 2012 Intercollegiate Ag Program (I-CAL)

- **Paige Jenkins**
  - 2012-2013 Student member Missouri State University Board of Governors
  - Chief Sustainability Commissioner Missouri State University
  - Student member of 2012 Presidential Search Committee

- **Samantha Warner**
  - 2009-2010 State FFA President
  - FFA National Officer Candidate
  - 2011-2012 Citizen Scholar
• Yu Zhang  
  o Received the travel award for attending the annual APS meeting in Honolulu, Hawaii, August, 2011.  
  o Finalist for the oral presentation in the Interdisciplinary Research Forum, April, 2011

The faculty within the School of Agriculture engage in a number of activities throughout the year that earn accolades. The following serves as an incomplete list of awards received by faculty within School of Agriculture.

- Acknowledgement from the Study Away office for involvement in International Service Learning
- Recognized by the National FFA as outstanding contributor to the National Parliamentary Procedure CDE.
- Missouri State University Winery received a silver medal (2010 Pink Catawba), and two bronze medals (2010 Chambourcin and Maroon Blend) at the International Eastern Wine Competition, held at Watkins Glen, New York, June 14-15, 2011
- Missouri State University received a bronze medal (2010 Chambourcin) at the San Francisco International Wine Competition held at San Francisco, California, June 17-19, 2011
- Missouri State University Winery received a double gold medal (2010 Pink Catawba), four silver medals (White Blend, Maroon Blend, 2010 Chambourcin, 2010 Norton), and a bronze medal (Peach Brandy) at the 2011 Indy International Wine Competition, held at Indianapolis, Indiana, August 3-5, 2011
- Missouri State University Winery received one gold medal (2010 Norton), two silver medals (2010 Catawba and 2010 Chambourcin), and one bronze medal (Maroon Blend) at the Mid-American Wine Competition held on the campus of Des Moines Area Community College in Ankeny, Iowa, July 11-13, 2011
- Missouri State University Winery received one silver medal (2010 Pink Catawba), and two bronze medals (White Blend, Maroon Blend) at the Colorado State Fair in Pueblo, Colorado, August 12, 2011
- Missouri State University Winery received a Gold medal (2009 Pink Catawba), and a silver medal (Port) at the Florida State International wine and Grape Juice Competition in Tampa, Florida, February 10-12, 2011

Service & Outreach:

The School of Agriculture remains active within the community and on campus. As such, the list of workshops, continued education opportunities and special events continues to grow and expand. The following serves as an incomplete list of continuing education courses and workshops hosted by the School of Agriculture at the Bond Learning Center or the Fruit Experiment Station for area producers in the past year. Additional workshops and events are currently in development.

- Spraying and Pruning Home Fruit Crops
- Growing Berries in the Home Garden Workshop
• Grafting Workshop
• Edible Landscape Gardening
• Horticultural Demonstration Area
• Ozark Home Landscape
• Ozark Arboretum
• Vegetable Growing Workshop
• Fall Fruit Tree Workshop
• Rain Garden
• District FFA Contest
• Two IHSA Horse Shows
• ASHA Ranch Horse Clinic and Show in the Spring and Fall
• NVRHA Horse Show
• FQHR On-line Judges Clinic
• Therapeutic Riding of the Ozarks
• Therapeutic Riding of the Ozarks Hippotherapy sessions

The faculty, staff and students with the School of Agriculture are dedicated to the Public Affairs Mission of Missouri State University. In addition to integrating current topics into classroom discussions, all members of the School are encouraged to take active roles in the community. The following serves as an incomplete list of workshops, recruitment and service activities participated in by faculty, staff and students of the School of Agriculture and shows a fraction of the high level of service practiced by those individuals.

Service:
• Farm Fest
• Ozark Empire Fair
• Student Showcase
• OTC Days
• Missouri Beef Industry Show Me Series: Cattle Theft Prevention Workshop
• 4-H Small Ruminant Camp
• Missouri Blueberry School
• Participation in meetings to design and implement strategy on international student recruitment
• Master gardener training on herbaceous annuals and perennials for Greene, Polk, Dade, Hickory and Pulaski counties
• TV and podcast interviews on various horticultural topics
• Lawn and Garden Show presentations
• Judging for activities such as FFA Contest, 4-H shows and county fairs
• Phone/Email consultations dealing with winemaking or distillation
• Wine analysis for the wine industry and public
• Office consultations (winery/distillation)
• Identified over 50 weeds, wildflowers, herbaceous plants or woody plants via e-mail and plant sample inquiries
• Collaborate with Project Hope (Nicaragua) in community and agricultural development and soil conservation and well-drilling projects for sub-urban and rural poor. (May-June 2011)
• Flower Variety Trial with Springfield/Greene County Botanical Center, the Greene County Master Gardeners Demonstration Gardens, and the MSU Grounds Department.
• Cut Flower Variety Trial for the Association of Specialty Cut Flower Growers, with MU Extension Horticulture Specialist Patrick Byers at the Springfield/Greene County Botanical Garden, summer 2011
• Evaluated grant proposals for International Elephant Foundation

Committees:
• SMACT Economics and Policy Subcommittee
• Sustainability Minor Action Committee
• Vice-Chair of Institutional Animal Care and Use Committee (IACUC)
• Faculty Senate
• Associate Superintendent of the National Parliamentary Procedure Career Development Event at National FFA Convention
• Member NCAA Validation Committee
• Advisory committee for Republic Schools Agriculture Education Program
• Advisory board for the Agriculture Education Division of the Ozark Empire Fair
• Agriculture Advisory Board for gifted program Phelps School
• Current President of the Southwest Missouri Beef Improvement Association
• President of International Elephant Foundation
• USDA Budget And Advocacy Committee – Non Land Grant Representative
• Agriculture Advisor to Senator Blunt, Congressman Long and Congresswomen Emerson

Membership:
• Current member in MVATA
• Current member ACTE
• Current member Missouri Angus Association
• Current member American Angus Association
• Current member Missouri Cattleman’s Association
• Current member National Cattlemen’s Association
• Current member of the Missouri Hereford Association
• Current member of the American Hereford Association
• Current member Southwest Missouri Beef Improvement Association
• Current member and 4-H leader
• Current member of American Boer Goat Association
• Current member of American Red Angus Association
• Current member of Tuberculosis committee in United States Animal Health Association
• Current member of Equine Disease committee in USAHA
• Current member of Alternate Livestock Disease committee in USAHA
• Current member of Animal Welfare Committee in USAHA
Abstracts:

Effects of Egg Yolk Source on the Cryopreservation of Stallion Spermatozoa
Gary W. Webb PhD, PAS, Codi L. Burris MS, Sarah E. Harmon MS, Rachel H. Baker MS

Three experiments were conducted to determine whether replacement of chicken egg yolk, as a component of freezing extenders, with egg yolk from other avian species would improve the post-thaw motility and percentage of intact acrosomes of stallion spermatozoa. In the first experiment, substitution of chicken egg yolk with chukar egg yolk, as a component of the lactose-ethylenediaminetetraacetic acid extender, improved (P < .05) the post-thaw motility of stallion spermatozoa. These results were not replicated in (IMV Technologies, Maple Grove, MN, USA) a more expansive study comparing 2%, 4%, 6%, or 8% egg yolk combined with INRA 96 when a “slow freeze” method was used, or the same substitution at levels ranging from 13% to 22% when egg yolk was combined with lactose-ethylenediaminetetraacetic acid for diluents used for a “fast freeze” method of cryopreservation. In the third study, egg yolks from regular and high omega-3 chicken eggs as well as from turkey, chukar, and mallard duck eggs were analyzed for lipid content and fatty acid profile. The yolk from the turkey eggs was higher (1,300 mg/100 g) and that from mallard ducks was lower (560 mg/100 g) in cholesterol as compared with the two types of chicken eggs and chukar egg yolk (range, 1,046-1,094 mg/100 g). In addition, the high omega-3 eggs did test higher for fatty acids (4.51 g/100 g) than other types of eggs (range, 0.28-0.73 g/100 g). Substitution of chicken egg yolk with turkey, but not duck, egg yolk resulted in higher post-thaw total motility (P < .05) for spermatozoa obtained from two of the three stallions used in the third experiment.

Effect of ergopeptines associated with tall fescue ingestion on recovery of horses subjected to standardized exercise tests

Gary W. Webb PhD, PAS, Susan Demster MS, Kelsie Minton MS, Susan P. Webb MS, Elizabeth L. Walker PhD and Benjamin Onyango PhD

Ten horses were paired by body weight, age, and skill level, and one of each pair was assigned to one of two groups. Horses were fed alfalfa hay and a mixture of commercial sweet feed and pellets. Horses in group A were fed fescue seed that contained both ergovaline and ergotamine (E+), whereas those in the other group were fed seed that was free from ergot alkaloids (E-). After the first 35 days, horses were switched to the opposite seed treatment. Seed was fed at 8.2% of the diet, resulting in 406 ppb of ergotamine plus ergovaline in the E+ diet. During weeks 3, 5, 7, and 10, horses were subjected to two separate standardized exercise tests (SETs). The aerobic test consisted of walking, trotting, and loping and was designed to maintain horse’s heart rate (HR) to less than 150 beats per minute (bpm). The anaerobic test consisted of 40 turns in less than 4 minutes in response to the movements of a mechanical cow and was designed to increase the horse’s HR to more than 150 bpm. There were no treatment effects on water consumption or sweat production. There were also no treatment effects on rectal temperature at rest or during recovery from the anaerobic SET. However, rectal temperatures were higher (P < .05) 1 and 30 minutes after the aerobic SET for horses consuming E+ seed. When horses were on the E+ treatment, HRs were lower (P < .05), both at rest and during the SET. HRs were also lower (P < .05) for the E+ treatment at 1 minute after the aerobic test and 5 and 10 minutes after the anaerobic test. Respiration rates were higher (P <.05) 30 minutes after the aerobic SET and 30 and 60 minutes after the anaerobic SET for the E+ treatment. Horses may have increased respiration rates to compensate for a reduction in the efficiency of evaporative cooling, which resulted from vasoconstriction of peripheral blood vessels.

Published in Journal of Equine Vet Science 2012 available online May 2012.
Performance of the 2002 NC-140 Cooperative Peach Rootstock Planting


Abstract:
In 2002, a peach [Prunus persica (L.) Batsch] trial consisting of eight rootstocks was planted at 17 sites in the United States, Canada and Mexico. ‘Redhaven’ was the scion at ten sites and ‘Cresthaven’ at the other seven sites. The rootstocks tested were Adesoto 101, Mr.S.2/5, Penta, Krymsk®2 (VSV-1), Krymsk®1 (VVA-1), Pumiselect®, Cadaman® and Lovell. After five years, trees on Cadaman® were similar in size and productivity to Lovell. Pumiselect® and Krymsk®2 exhibited many problems with survival, suckering and fruit weight. Adesoto 101, Mr.S.2/5 and Penta all showed potential as semi-dwarfing rootstocks although mortality and suckering were excessive at some sites. Krymsk®1 showed potential as a dwarfing rootstock with a trunk cross-sectional area 35% of Lovell. Trees on Krymsk®1 rootstock also had fruit weight equal to the more vigorous rootstocks and had the highest yield efficiency.
Title: Six-Year Performance of 14 Prunus Rootstocks at 11 Sites in the 2001 NC-140 Peach Trial


Abstract:

Fourteen Prunus rootstock cultivars and selections budded with either ‘Redtop’, ‘Redhaven’ or ‘Cresthaven’ peach [Prunus persica (L.) Batsch] were planted at 11 locations in North America in 2001 in a randomized block design with a tree spacing of 5 by 6 m and 8 replicates. This test planting was an NC-140 Cooperative Regional Rootstock Project (www.nc140.org). There were 14 rootstocks in total, which included three peach seedling rootstocks: Lovell, Bailey, and Guardian® ‘BY520-9’ [selection SC-17]. Clonal rootstocks included the peach × almond hybrids BH-4 and SLAP (Cornerstone); peach × plum hybrids K146-43 (Controller 5), K146-44, and P30-135 (Controller 9); interspecific plum hybrids Hiawatha, Jaspi and Julior; interspecific Prunus hybrids Cadaman® and VVA-1 (Krymsk® 1); and Prunus pumila L. selection Pumiselect®. Final tree size was largest in California, Georgia, Maryland, and South Carolina. BH-4, SLAP, SC-17, Lovell, and Cadaman® were the most vigorous rootstocks. Jaspi, K146-44, and VVA-1 were the least vigorous, having trunk cross-sectional areas 20-50% of Lovell-rooted trees. No rootstock had a significantly higher survival rate than Lovell at all locations, but Bailey, K146-44, and P30-135 had good survival at all test sites. Julior and Jaspi consistently produced root suckers. Pumiselect® had anchorage problems at several locations. Cumulative fruit yields were highest on the peach seedling, peach × almond, and Cadaman® rootstocks. Lowest cumulative yields were from the small trees on Jaspi, VVA-1 and K146-44 rootstocks. Fruit weight did not differ much among rootstocks though cultivars on Pumiselect® and K146-43 often had smaller fruit. Cumulative yield efficiency was not consistently related to tree size. Rootstocks influenced dates of bloom and harvest, but not in a consistent manner across locations/cultivars.
Title: Productivity Comparison of Fourteen Highbush Blueberry Cultivars in Missouri, 2000-2008

Authors: M.L. Kaps, P.L. Byers and M.B. Odneal

Abstract:

Eleven northern and three southern highbush blueberry (Vaccinium corymbosum L.) cultivars were evaluated for productivity at Mountain Grove in south-central Missouri. The planting was established in 1998 on a Viracon silt loam soil amended with organic matter and sulfur, the latter to lower soil pH. Plant spacing was 1.2 m in row and 3 m between rows. Drip irrigation was installed and rows were mulched with wood chips and shredded bark. The highest yielding cultivars were ‘Brigitta Blue’, ‘Darrow’, ‘Legacy’, ‘Nelson’ and ‘Reka’, all above 4.0 kg per plant (2000-2008 mean). ‘Bluecrop’, a standard cultivar in Missouri, yielded 3.3 kg per plant. Marketable yield for all cultivars was 98% (2000-2003 mean). Berry weight for all cultivars was 1.9 g per berry (2000-2006 mean). The cultivar ‘Chandler’ had the highest berry weight at 3.0 g. Others cultivars ‘Brigittia Blue’, ‘Legacy’, ‘Nelson’ and ‘Nui’ had berry weights just above 2.0 g. The cultivar ‘Reka’ was lowest in berry weight at 1.3 g. Basal cane number per plant for all cultivars was 6.4 with a range among cultivars between 1.3 and 22.3 per plant (2003-2006 mean). Plant height and canopy spread for all cultivars were 1.4 and 1.3 m (2000-2006 mean), respectively.
TRAPS BAITED WITH ISOPROPANOL ATTRACT THE AMERICAN CARRION BEETLE, NECROPHILA AMERICANA (L.) (COLEOPTERA: SILPHIDAE)

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ABSTRACT
Field experiments showed that females and males of the American carrion beetle, Necrophila americana (L.), are attracted to 45% isopropanol. Numbers of beetles caught in isopropanol-baited Baker traps reflect differences between microhabitats monitored with this lure. Results also suggest that in addition to utilizing the ground as microhabitat, N. americana explores tree canopies.

Key Words: Baker trap, habitat, tree canopy, forensic entomology
JOHNSON, D., LEWIS, B., ROM, C., FRIEDRICH, H., BRYANT, R.J., PSZCZOLKOWSKI, M.

ORGANIC FRUIT PRODUCTION NEEDS AND PEST MANAGEMENT PRACTICES IN THE SOUTHEASTERN UNITED STATES.

TECHNICAL ABSTRACT:
In 2004, client-based focus groups identified several needs for organic fruit production in the Southeastern USA: establish “go-to” personnel to increase interaction between researchers and organic producers; conduct more science-based research on soil, pest and nutrient management; develop information to be summarized in printed guides on organic production budgets and organic production practices; and strengthen local market development. This study was conducted to evaluate several pest management practices that could be adapted for organic fruit production. Demonstration blocks in Arkansas showed that early and late season generations of codling moth (CM) and Oriental fruit moth (OFM) could be controlled with CM granulosis virus and Bt when integrated with mating disruption. This resulted in less than 1% fruit damage at harvest. Plum curculio adults disperse into the perimeter of fruit orchards in the spring. When plum curculio adults were attracted to perimeter apple trees baited with dispensers releasing volatiles of grandisoic acid (aggregation pheromone) and one or two kairomone compounds, benzaldehyde and plum essence, they caused significantly more fruit feeding damage in baited trees than on adjacent unbaited trees. Thus, there is potential for using bait trees in apples to focus plum curculio damage. A further advantage occurs with the application of a nematode soil drench to reduce plum curculio larva survival in soil under baited trees. Green June beetle adults feed on ripening fruit. Multiple yellow funnel traps baited with a lure of five-component volatile blend or 91% isopropanol were effective in attracting green June beetles and may have potential for use in mass trapping of this pest.
ISOPROPANOL ATTRACTS THE GREEN LACEWING, CHRYSOPA QUADRIPOUNCTATA (NEUROPTERA: CHRYSOPIDAE)

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ABSTRACT:
Adult female green lacewings, Chrysopa quadripunctata Burmeister, were attracted to traps baited with 45% isopropanol in an unsprayed apple orchard in Missouri, USA. No lacewings were attracted to the unbaited traps. To the best of our knowledge this is the first report on a semiochemical that attracts lacewings of this species.

Paper featured in
ARTEMISIA ANNUA EXTRACTS, ARTEMISININ AND 1,8-CINEOLE PREVENT FRUIT INFESTATION BY MAJOR, COSMOPOLITAN PEST OF APPLES

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ABSTRACT

Context: Extracts of Artemisia annua (L.) (Asteraceae) and artemisinins are used for treatment of malaria, parasitic infections and have potent anticancer properties in cell lines. Eucalyptus oil and 1,8-cineole have antimicrobial, immune-stimulatory, anti-inflammatory, antioxidant, analgesic, and spasmolytic effects. Codling moth, Cydia pomonella, (L.) (Tortricidae), is a major cosmopolitan pest of the apple, potentially causing damage translating to 40 billion US dollars per year, globally. Currently used control measures are either hazardous to agricultural workers and harmful to environment, or ineffective. The potential of plant-derived semiochemicals for codling moth control is heavily understudied.

Objective: This study evaluated the potential of A. annua extracts, and two chemicals that this plant contains: artemisinin and 1,8-cineole for preventing apple feeding and infestation by neonate Cydia pomonella larvae.

Methods: We studied effects of A. annua extracts, artemisinin and 1,8-cineole on apple infestation by neonate codling moth larvae using fruit choice assay in laboratory experiments. Preference of fruit treated with test solutions versus fruit treated with solvent was recorded and analyzed.

Results: Crude A. annua extracts prevented fruit feeding at 1, 3, and 10 mg/ml. Artemisinin had feeding deterrent effects at 10 and 30 mg/ml, and 1,8-cineole at 100 and 300 mg/ml.

Discussion and Conclusions: A. annua contains chemicals that prevent apple infestation by codling moth neonates. Artemisinin and 1,8-cineole are among them, but there are other, polar constituents of A. annua, which have similar effects. There is a potential of using our findings in codling moth control and production of codling moth-resistant apples.

Keywords: Codling moth, Cydia pomonella, sweet annie, apple, fruit feeding, eucalyptol
EFFECTS OF GINKGO BILOBA CONSTITUENTS ON FRUIT-INFESTING BEHAVIOR OF CODLING MOTH (CYDIA POMONELLA) IN APPLES

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ABSTRACT: Codling moth, Cydia pomonella (L.), is a cosmopolitan pest of apple, potentially causing severe damage to the fruit. Currently used methods of combating this insect do not warrant full success or are harmful to the environment. The use of plant derived semiochemicals for manipulation with fruit-infesting behavior is one of the new avenues for controlling this pest. Here, we explore the potential of Ginkgo biloba and its synthetic metabolites for preventing apple feeding and infestation by neonate larvae of C. pomonella. Experiments with crude extracts indicated that deterrent constituents of ginkgo are present among alkylphenols, terpene trilactones, and flavonol glycosides. Further experiments with ginkgo synthetic metabolites of medical importance, ginkgolic acids, kaempferol, quercetin, isorhamnetin, ginkgolides, and bilobalide, indicated that three out of these chemicals have feeding deterrent properties. Ginkgolic acid 15:0 prevented fruit infestation at concentrations as low as 1 mg/mL, bilobalide had deterrent effects at 0.1 mg/mL and higher concentrations, and ginkgolide B at 10 mg/mL. On the other hand, kaempferol and quercetin promoted fruit infestation by codling moth neonates. Ginkgolic acids 13:0, 15:1, and 17:1, isorhamnetin, and ginkgolides A and C had no effects on fruit infestation-related behavior. Our research is the first report showing that ginkgo constituents influence fruit infestation behavior and have potential applications in fruit protection.

KEYWORDS: Codling moth, Cydia pomonella, Ginkgo biloba, insect feeding
POTENTIAL OF HERBAL MEDICINE PRODUCTS FOR PREVENTING FRUIT INFESTATION BY CODLING MOTH NEONATES

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ABSTRACT:
Effects of popular herbal medicine products (dietary supplements) on fruit infesting behavior of neonate codling moth, Cydia pomonella, larvae were studied. The supplements based on Ginkgo biloba, Artemisia sp., and Tanacetum sp. showed the most promising potential for preventing fruit infestation. Five secondary metabolites from these plants were identified as insect feeding deterrents.
EFFECTS OF QUININE, QUINIDINE AND DENATONIUM ON FEEDING BY CODLING MOTH NEONATES

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Effects of bitter tasting compounds on feeding behavior of neonate larvae were studied in codling moth, Cydia pomonella. Preliminary results show that denatonium delays feeding commencement and reduces amounts of food consumed. Quinine and quinidine at concentrations up to 0.5 mg/ml did not have significant effects on feeding behavior of the larvae. Exposure of the larvae to food treated with denatonium and phospholipase C inhibitor suggests that phospholipase C is involved in transduction of the signal from denatonium.

Abstract
This study examines public perceptions of, and likely reactions to, an act of bioterrorism targeting the US food supply. Results from factor analysis of survey data suggest a range of responses including: public panic, raised fears or emotions, a controlled response or an acceptance that such an event is inevitable. Reactions are reflective of peoples’ cognitive interpretations or affective responses to the risks posed. Cluster analysis and regression results suggest that authorities may successfully position risk communication messages based on the condition that people believe the government and private institutions can function in the face of a food attack. This finding underscores the pivotal role played by trust and confidence in institutions in restoring calm after a bioterrorist event. Fine tuning of communications for different population groups may be necessary if certain Americans’ perceive the risk of a bioterrorist event in a less rational manner.

Abstract
This study examines public perceptions of the safety of fresh produce (spinach and lettuce), beef, and poultry, employing survey data collected during the 2006 nationwide recall of fresh spinach contaminated with E. coli O157:H7. The results show that white respondents perceived all products to be safe. In contrast, young people, people with only a high school education, and those with lower household incomes ($50,000 or below), were more likely to view fresh produce, beef, and poultry as unsafe. Trust in the USDA as well as conventional farmers contributed toward more positive perceptions of spinach and lettuce. Low levels of objective knowledge about foodborne pathogens and resulting illnesses contributed to negative food safety perceptions. Efforts should be directed toward additional public education and outreach about general aspects of food safety, especially targeting youth, low income groups, non-whites, and those with education at or below a high school level.
Effects of Tannin Levels on Color Stability in Norton Wine

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Proper color development in red wines is thought to require tannin to anthocyanin ratios greater than two. However, research supporting this is limited. Norton wines typically have tannin to anthocyanin ratios less than one due to moderate amounts of tannin and high anthocyanin levels. An experiment was conducted to determine how the addition of tannin would affect long term color stability and the formation of polymeric pigments in Norton wine. Commercial grape seed tannin was added at 500 and 1000 mg/L levels after pressing. The wines were kept in glass containers with periodic splash racking to incorporate oxygen during the aging process of three years. Tannin additions did not result in significant differences in color (absorbance at 420, 520, and 620 nm) or the fraction of color due to copigmentation. Greater tannin levels resulted in higher ratios of large to small polymeric pigments but did not result in significantly higher amounts of polymeric pigments. Both small and large polymeric pigments increased for all wines throughout the aging process. Increasing tannin levels in the wines resulted in less total red pigments and free anthocyanins. All of the wines retained relatively high levels of free anthocyanins and absorbance at 520 nm. These results suggest that not all wines require tannin to anthocyanin ratios greater than two for acceptable color stability during extended aging.
Effects of Increasing Levels of Distillers Dried Grains on Intake and Digestibility of Moderate Quality Fescue Hay

Ethanol production in the United States has increased more than 7-fold in the past decade, displacing nearly 1/3 of corn once used for livestock feed. Producers must find alternative feed sources, such as distillers dried grains plus solubles (DDGS). Including DDGS in dairy and finishing diets has been widely studied, but less information is available regarding the use of DDGS as a supplement for cattle consuming a forage-based diet. The purpose of this study was to determine the differences in voluntary intake and digestibility of moderate quality, long-stem fescue hay (9.5% CP, 72.3% NDF; DM-basis) by steers consuming increasing levels of DDGS (27.7% CP, 35.7% NDF; DM-basis). Four Hereford steers (384 ± 42.8 kg) were housed in individual pens (4 x 4 m) and randomly assigned to treatment blocks in a completely randomized, replicated 4 x 4 Latin Square design. Steers were fed daily one of 4 levels of DDGS (0, 0.2, 0.4, or 0.8% of BW; DM-basis), denoted as control (CON), low (LOW), moderate (MOD) and high (HI). Steers were fed DDGS at 0800 and ad-libitum hay was offered at 0830. Steers had access to fresh water and salt at all times. Each pd consisted of a 10-d adaptation and a 7-d collection, during which hay intake, orts, and total fecal output were measured daily, followed by a 10-d washout. Data were analyzed using PROC Mixed, where the model included the fixed effects of treatment and pd and steer was included as a random variable. Period was the repeated measure and included steer nested within pd. Hay intake (kg DM or % of BW) did not differ (P > 0.47) between treatments. Total tract DM digestibility did not differ between CON and LOW steers but tended (P = 0.09) to be greater for MOD compared to LOW (56.48 vs. 51.11%, respectively). Digestibility did not differ between HI and MOD, but HI steers had greater (P < 0.05) DM digestibility (60.54%) compared to LOW and CON steers (51.11 and 51.98%, respectively). Digestibility of NDF did not differ between treatments. Increased DDGS did not affect hay intake; however, total tract digestibility of diet DM was improved as DDGS supplementation increased.

DDGS fescue hay intake digestibility