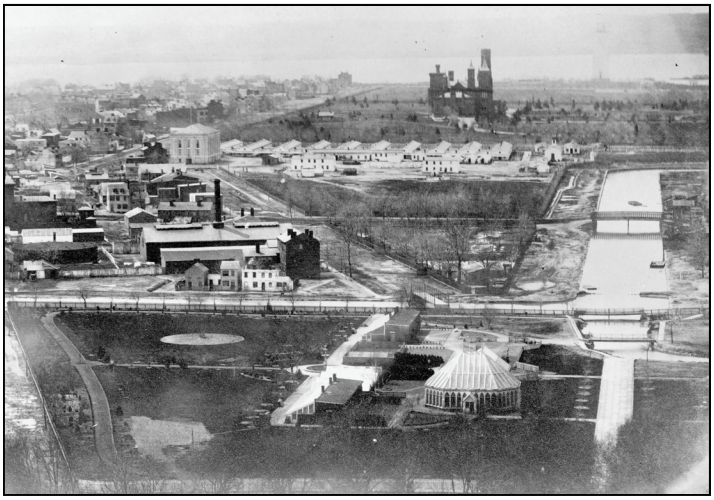
FY2012 U.S. Department of Agriculture Annual Report on Technology Transfer: Agricultural Research Service Section

1864 **Research Facilities, National Mall, DC**



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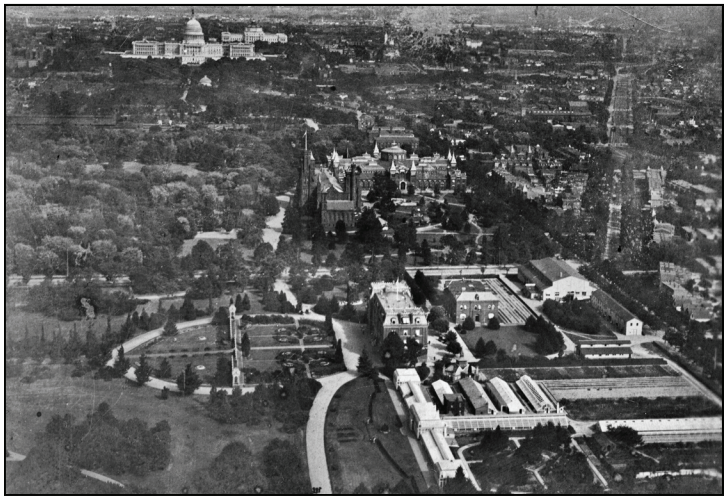


Celebrating 150 YEARS of Research for a Growing World

Release Date: February 1, 2013

3. Agricultural Research Service (ARS)

http://www.ars.usda.gov/main/main.htm

3.1. Mission Statement

ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provides information access and dissemination to:

- ensure high-quality, safe food, and other agricultural products;
- assess the nutritional needs of Americans;
- sustain a competitive agricultural economy;
- enhance U.S. natural resources and the environment; and
- provide economic opportunities for rural citizens, communities, and society as a whole.

3.2. Nature and Structure of Research Program

ARS is USDA's principal intramural scientific research agency. Agency goals are to find solutions to agricultural problems that affect Americans every day, from field to table, such as (a) protecting crops and livestock from pests and diseases, (b) improving the quality and safety of agricultural products, (c) determining the best nutrition for people from infancy to old age, (d) sustaining our soil and other natural resources, (e) ensuring profitability for farmers and processors, and (f) keeping costs down for consumers.

ARS employs over 8,000 people; approximately 1,950 permanent full-time scientists and approximately 3,300 technical and support staffs conduct research in projects funded by Congressional appropriations at more than 90 locations. Research projects are managed as 19 National Programs (Table 1). The Office of National Programs in Beltsville, MD plans the scope and objectives of Agency's research projects, while eight Area Directors implement research projects at the locations in their geographic areas.

Table 1. Research program management of ARS, showing 19 National Programs in four pillars.

Animal Production & Protection	Natural Resources & Sustainable Ag Systems	Crop Production & Protection	Nutrition, Food Safety and Quality
Food Animal Production	Water Availability & Watershed Management	Plant Genetic Resources, Genomics & Genetic Improvement	Human Nutrition
Animal Health	Climate Change, Soils, and Emissions	Plant Biological & Molecular Processes	Food Safety (animal & plant products)
Veterinary, Medical, & Urban Entomology	Pasture, Forage & Range Land Systems	Plant Diseases	Quality and Utilization of Agricultural Products

Aquaculture	Bioenergy	Crop Protection & Quarantine	
	Agricultural & Industrial Byproduct	Crop Production	
	Agricultural System Competitiveness & Sustainability	Methyl Bromide Alternative	

ARS conducts a series of reviews designed to ensure the relevance and quality of its research work and to maintain the highest possible standards for its scientists. Customer input helps keep the research focused on the needs of the American food and agricultural system. Plans for each of the approximately 1,000 research projects undergo a thorough independent external prospective peer review managed by the Office of Scientific Quality Review (OSQR). All ARS employees, including the scientific workforce, are subject to annual performance reviews, and all scientists and engineers have technology transfer as a performance element in their annual performance appraisal. Senior scientists undergo a rigorous peer review (Research Position Evaluation System-RPES) on a 3- to 5-year cycle. These processes ensure the continuing high quality output of the ARS research addressing the needs of U.S. agriculture.

3.3. ARS Approach and Plans for Conducting Technology Transfer

Because of the delegations of authority by the Secretary (stated previously), ARS's Office of Technology Transfer (OTT) is assigned the responsibility for obtaining patent protection for intellectual property (IP), developing strategic partnerships with outside organizations, and performing other activities that effectively transfer ARS research outcomes and technologies to the marketplace. USDA's Office of the General Counsel provides legal guidance to OTT in regard to intellectual property

The technology transfer program is centralized in policy and approval procedures, and provides one-on-one customer service to intramural researchers through *Technology Transfer Coordinators* (TTCs) in the Area Offices. To facilitate technology transfer, the office is organized into five sections. The *Administrative and Headquarters Section* conducts day-to-day operations, coordinates technology transfer policy development, and executes licenses and Cooperative Research and Development Agreements (CRADAs). The *Patent Section* (8 in-house registered patent agents) provides strategic guidance to scientists in protecting IP, coordinates invention reports and Invention Disclosure Review Committees, prepares and prosecutes patent applications, and oversees any patent applications prepared by cooperator law firms for domestic and foreign patent rights and contract law firms for foreign patent rights. The *Licensing Section* (4 specialists) negotiates licenses for IP developed by intramural scientists in any USDA agency and monitors license performance. The *Technology Transfer Coordinators* (TTCs) are strategically stationed across the United States and serve as liaisons with scientists, ARS managers, the patent advisors, licensing specialists, university partners, and the private sector. They also negotiate CRADAs and other technology transfer agreements.

Technology transfer is accomplished through many mechanisms, such as:

- developing written information for customers and stakeholders, including scientific publications, publications in trade journals, and reports to stakeholders;
- releasing plant germplasm to the public;
- transferring research materials to scientists outside of ARS;
- entering into formal partnership agreements, such as CRADAs, and other cooperative agreements;

- delivering specific research results to regulatory agencies to support their actions;
- licensing IP (patents, Plant Variety Protections Certificates, and biological materials);
- participating in meetings with industry organizations and universities, workshops and field days; and distributing information to the public via the ARS Information Staff, the National Agricultural Library, and other sources.

Because the ARS mission is to transfer technologies for broad public use by the most effective mechanism, ARS pursues patents and licensing principally when this facilitates technology transfer to the marketplace. This is usually the case when complementary investment by the private sector is necessary to commercialize a product, and patent protection is required to protect this investment. By policy of ARS, IP considered a research tools is not protected so as to encourage scientific research. In licensing practices, ARS continues to reserve the right to allow use of any protected technology for research purposes (non-commercial).

Meaningful performance metrics in technology transfer are often difficult for research agencies. ARS is continuing to work on defining better metrics for technology transfer within USDA. For example, for ARS, successful outcomes may include improved agricultural practices, scientific information that enhances U.S. competitiveness, increased awareness about pathogens to help prevent human and animal diseases, or findings that help corporations and universities make informed decisions in allocating their research resources. Many of these outcomes do not require a patent and subsequent license for implementation. Additionally, ARS uses its ATIP program (see below) to gather economic impacts of technology adoption by private sector partners, including jobs created, regional impact on the economy, and ability to match technical expertise of intramural researchers with firms who can capitalize on this national network of labs, regardless of geographic proximity to the businesses.

Licensing policies also promotes small business success with nominal licensing fees in the early years, but with annual maintenance fees and royalties that escalate in outyears, usually after sales of product have begun. Terms of sublicensing by the exclusive licensee also incentivize small-businesses, in that the licensee retains a substantial percentage of all fees and royalties arising from the sublicenses. This policy further enhances commercialization by encouraging broadest utilization of a federal invention. ARS also incentivizes scientists on the reporting of inventions, patenting, and licensing by providing 25% of the license revenues to inventors (statute requires ≥15%). Thus, there are policies in place that incentivize commercialization, minimize transaction costs, yet provide fair and equitable compensation for those who create federal innovations. Development of the ATIP program further enhances opportunities for the outcomes of scientists to be adopted, thereby documenting impact of their accomplishments which is used in evaluating promotions.

These are all parts of a robust and effective technology transfer program that consists of a variety of mechanisms and programs to complement the research conducted by the agencies. The technology transfer program must be clearly communicated to scientists in a *Policy and Procedures* document that describes responsibilities, opportunities, and processes to effect technology transfer.

3.4. Agricultural Technology Innovation Partnership program (ATIP)

ARS established ATIP to further enhance likelihood that USDA intramural research outcomes would be adopted by the private sector for commercialization. Although replete with scientific expertise, the intramural research components of USDA do not have the resources nor the authority to provide business partners of USDA (licensees) with marketing, manufacturing, and fiscal resources (complementary assets) needed by them for their businesses to be successful. Consequently, ATIP was established to

strategically form geographic partnerships with well-established economic development entities that excel in providing the complementary assets that ARS cannot. Ten organizations across the U.S. each have a Partnership Intermediary Agreement with ARS Office of Technology Transfer to formalize their membership in ATIP. This network represents a novel approach to enhance and accelerate commercialization of USDA-ARS research outcomes.

The ATIP Network is comprised of 9 technology-based economic development (TBED) "Partners", each serving as a portal anchored to an ARS Area. Partners become members of ATIP through a Partnership Intermediary Agreement (PIA) executed with the Office of Technology Transfer. Members of ATIP include the Maryland Technology Development Corporation (TEDCO), Mississippi Technology Alliance (MTA), Wisconsin Security Research Consortium (WSRC), Georgia Research Alliance (GRA), Ben Franklin Technology Development Authority (BFTDA), Kansas Bioscience Authority (KBA), Center for Innovation at Arlington, TX (CFI), California Association for Local Economic Development (CALED), and the Center for Innovative Food Technologies, Toledo, OH (CIFT).

In 2011, the members of ATIP established a Foundation to provide a unifying entity independent of ARS, as well as, the flexibility to engage other organizations that have a vested interest in seeing USDA research outcomes adopted by the private sector. Foundation objects are: (1) Expedite the transition of USDA-ARS technologies from USDA-ARS labs into the commercial sector; (2) Seek funds to support the research needs of the USDA-ARS; (3) Develop industry access to utilize USDA-ARS research and research facilities; (4) Create sustainable communities by promoting regional innovation clusters, supported by USDA/ARS research outcomes; and (5) Host regional events co-sponsored with USDA-ARS, showcasing technologies and research capacity.

The Foundation's interface with the USDA-ARS for seeking funds to support ARS research needs will be through the USDA-ARS Liaison Committee (LC). The LC is an internal USDA committee and not a part of the Foundation. The LC serves three primary purposes: (1) to ensure the independence of USDA-ARS research activities; (2) maintain mission relevance; and (3) align the purpose of research and mission with the work of the ATIP Foundation.

In FY 2012 the ATIP accomplished:

- **Foundation**

  Developed and initiate an administrative structure and strategy plan for the ATIP Foundation. Developed a white paper on the common message for the ATIP program that can be used by ATIP members and ARS in presentations to stakeholders. This paper was used by ARS to create a brochure on the program (https://www.ars.usda.gov/sp2UserFiles/Place/01090000/ATIPbrochure.pdf).

  Co-PI on NIFA grant "Accelerated Development of Commercial Hydrotreated Renewable Jet (HRJ) Fuel from Redesigned Oil Seed Feedstock Supply Chains." ATIP's role is to organize rural business development forums to identify regional issues that are perceived as barriers to establishment of advanced biofuel supply chains, and build bridges for development of expanded trans-supply chain partnership networks.

- **California Association for Local Economic Development (CALED)**

  Held a Strategic Planning Conference to discuss refinement and realignment of CALED

priorities incident to its change in leadership and changes to Economic Development resources in California.

Utilized WIN (CALED Steering Committee is also known as Western Innovation Network or WIN) as its advisory group for the Innovation Portion of an EDA grant. ARS is expected to play a role in this grant. Facilitated ARS presenting information on research capacity and opportunities for partnering at numerous meetings: San Joaquin Valley Regional Economic Summit; City of Maricopa / AzBio meeting; Project 17 / Salinas Economic Development Meeting; and Project 17 / CSU Monterey Bay.

Facilitated discussions at the Chico Sierra Nevada Challenge on partnering opportunities. Led to a follow-up meeting to identify appropriate ARS technologies and research capacities to support Chico-area businesses and economic development .

Involved in discussions on applications of broadband technologies for Fresno-area economic development with USDA-ARS, USDA-Rural Development, and Lawrence Livermore National Laboratory (8/31/2012).

- **Center for Innovation (CFI)**

Established in 2010 TechComm as an inter-Department coalition of five Federal Departments (USDA, U. S. Department of Defense, U.S. Department of Homeland Security, National Institutes of Health, and U.S. Department of Energy) to coordinate technology transfer across the Departments. TechComm is establishing a network of "affiliate partner intermediaries," comprised of corporations, universities, economic development organizations, trade associations, venture funds, municipalities, and government entities throughout the U.S. CFI works with and through this network of affiliate partners; connecting the affiliate partners to TechComm's Federal partner Departments and labs, thereby enabling technology transfer and commercialization on a broad, national and international scale.

Established in 2012 the Beta Lab Network, with 14 Federal labs to work directly with the CFI on in the development of the TechComm model. The Beta Lab Network engages these selected federal labs to provide guidance, direction, and oversight to TechComm on how federal labs can interact with TechComm's "Affiliate Partner Network" of corporate, university, economic development, venture capital, and municipal affiliates. TechComm works with and through the Beta Lab Network to develop its processes, leveraging its Affiliate Partner Network to commercialize Beta Lab technologies and invite R&D through cooperative research.

Established strategic goals, as well as the initiatives and projects necessary to achieve the goals and managed four "Industry Consortiums." These Consortiums are essentially collaborative coalitions comprised of government, academic, and industry partners, focused on emergent opportunities in (1) biofuels, biochemicals; and bio products; (2) unmanned aircraft & vehicle systems, (3) software development: and (4) health care/medical device opportunities.

- **Center for Innovative Food Technology (CIFT)**

  Facilitated the use of USDA-ARS patented technologies by students in classes at Bowling Green State University Dallas Hamilton Center for Entrepreneurial Leadership. These technologies were selected based on relevance to the local industry. Students presented their class results to more than 40 representatives from Ohio companies.

  Held an Agricultural & Business Innovation Forum on specific specialty crop varieties for food processing or regional applicability, new market opportunities, organic and sustainable production practices, composting, soilless mixtures for increased performance, spray application technology, disease detection and reduction, emerging pests, the impact on season extension both in varieties and profitability, and funding outlets to support operations. More than 75 growers and industry partners attended. Local congressional leaders and Deputy Secretary Merrigan were among the presenters. This was the official rollout announcement of similar activities throughout the ATIP network.

  Held an Agricultural & Business Innovation Forum on chemical detection capabilities, hyperspectral imaging, sensor technology, potato cultivars, vegetable oil investigations, and advanced ingredients. More than 20 food processors and suppliers attended.

  Collaborated with Ohio Bio-products Innovation Center (OBIC) to present several webinars for publicizing USDA-ARS technologies to a broad audience. At least two companies are in further discussion on commercializing presented technologies.

- **Georgia Research Alliance (GRA)**

  Identified significant research projects and commercialization efforts at its six partner universities for research and development collaborations with South Atlantic Area of the Agricultural Research Service. Including: To address the staggering obesity issue in Georgia, where 65 percent of adults and 40 percent of children are overweight or obese, the University of Georgia has launched an Obesity Initiative. Led by GRA Eminent Scholar Cliff Baile, the initiative involves more that 100 faculty from a variety of disciplines and will examine the issue from research, technology and community perspectives.

- **Kansas Bioscience Authority (KBA)**

  Awarded $868,515 in Research Transition Program funds over three years in support of a team of researchers led by Kansas State College of Veterinary Medicine and USDA-ARS Arthropod-Borne Animal Diseases Research Unit to establish diagnostic and control methods to address Schmallenberg virus (SBV). SBV is an emerging animal disease causing considerable losses in European cattle, goat and heep herds. The bio-containment work for this project will be conducted in the Biosecurity Research Institute (BRI) at Kansas State.

- **Mississippi Technology Alliance (MTA)**

  Managed the MS Biomass and Renewable Energy Council which will provide some good cross-over activities with USDA. Completed a statewide study for Mississippi BIO in conjunction with Battelle to kick-start BIO industry group. Interviewed ARS Research Leaders in Stoneville to determine their laboratories research competencies. Interview information will be used to determine the level of Industry-academic-government

partnerships, collaborations, and research commercialization in Mississippi. Distributed ARS patent portfolios to potential cooperators for commercialization.

- **Maryland Technology Development Corporation (TEDCO)**

  Took the lead for the Foundation on the NIFA grant "Accelerated Development of Commercial Hydrotreated Renewable Jet (HRJ) Fuel from Redesigned Oil Seed Feedstock Supply Chains" (see above under Foundation).

  Held an Agricultural & Business Innovation Forum on water management, greenhouse management and aquaculture. Irrigation systems, cover crops, utilization of fish culture with aquaponics and year-round utilization of greenhouses were some of the major issues for producer growers in the Mid and Upper Shore region. Attended by over 50 growers and farmers. In addition, ATIP members participated in this Forum, as a "training session" for adopting this format across the ATIP landscape.
  USDA commercial partners received technical and business assistance through the Rural Business Innovation Initiative (RBI^2). TEDCO business mentors provide assistance to technology-based companies in five rural regions of Maryland. The goal of RBI^2 is to help companies advance to the next growth level through intensive mentoring. Companies may receive special projects for prototype development or in depth business analysis.

  Hosted a meeting of University of Maryland Extension (UME) agents across the state and ARS scientists to discuss how Extension could work more closely with ARS. UME director Andy Lazur led the discussion on extension activities on possible projects.

- **Pennsylvania Ben Franklin Technology Development Authority (BFTDA)**

  Held monthly discussions with state agency partners, PA Department of Agriculture and PA Department of Conservation and Natural Resources in which ARS research capacity and technologies were discussed.

- **Wisconsin Security Research Consortium (WSRC)**

  Developed relationship with the Wisconsin Energy Research Consortium to focus on the commercialization of bio fuels. Connected ARS researchers and the Consortium to discuss collaboration.

  Facilitated the use of USDA-ARS patented technologies by students in CAPStone classes at the University of Wisconsin at Oshkosh. This program is currently in its 3rd year. Teamed with the Wisconsin Innovation Network to allow the students to present their business plans to regional businesses. Over 20 people attended this event.

  Coordinated a meeting with key leadership from the University of Wisconsin at Platteville about the possibility of UW Platteville providing their farming 101 course ARS researchers who may not have a farming background. This would provide the ARS researchers an opportunity to work on a research farm and develop a better understanding of how their research may impact farm operations.

3.5. Technology Transfer Accomplishments

- ARS continues to prioritize the development of collaborative research projects with ARS scientists for near-term commercialization of outcomes. CRADA numbers were slightly lower from 1 CRADA per 27 scientists in FY2011to 1 CRADA per 35 scientists in FY2012. The total number of other R&D agreements was also down from slightly from more than 1 agreement per 1.5 scientists in FY2011to slightly less than 1 agreement per 1.5 scientists in FY2012. The number of agreements per scientist has been inconsistent over the last five years and no trends can be noted. 53 new CRADAs were executed and the research was expanded in 82 active CRADAs. The current 243 active CRADAs are valued at nearly $125M over the course of their life (up to 5 years) with $22M in funds directly to ARS researchers. The trend in research is to form large multi-disciplinary teams. This is reflected in the number of CRADA having multiple partners which has more than doubled in the last three years. Approximately half of the active CRADAs are with U.S. small businesses. See Figures 1, 2 and 3 in Section 10.

- ARS received 137 new invention disclosures and filed 108 patent applications with the U.S. Patent and Trademark Office (USPTO) in FY2012. Approximately 8% more invention disclosures were received this year as compared to last year. If we take into account a 12% drop in the number of scientists in FY2012 (1835) compared to FY2011 (2094), the increase in invention disclosures is quite significant. As compared to FY2011, there was significant increase (nearly 3-fold) in the percentage of ARS-University co-owned disclosures in FY2012. This reflects the fact that ARS scientists are located on the campus of many of the 1862 Landgrant Universities. A trend can be seen in an increase in the number of invention disclosures on plant cultivars. ARS, as well as our university collaborators, is adapting with new policies to the industry trend and standard. Our industry stakeholders are changing from a system of publically released plant cultivars to a system of protection and more intense marketing. See Figure 4, 5, 6, and 7 in Section 10.

- The ARS patenting and licensing program has a strong emphasis on partnerships with small businesses and universities. Of the 31 new licenses that were executed, 15 (48%) were to small businesses and 12 (39%) to universities. Even though the number of income bearing licenses has steadily increased from 313 to 360 over the last five years, the percent of those licenses that were granted exclusively remained constant at ~70%. Over 60% the revenue generated came from 2 licenses. See Figure 8 and 9 in Section 10.

- The number of peer-reviewed publications per scientist has steadily been increasing from 2.4 in FY2009 to 2.7 in FY2012. The number of presentations at meetings, as reflected in the number of abstracts, has remained constant at a little less than 2 per scientists. See Figure 10 and 11 in Section 10.

- A new position (Technology Transfer Liaison) was created. The major emphasis of this position will be to coordinate the Agricultural Technology Innovation Partnership (ATIP) activities across Areas. Currently, the Technology Transfer Coordinator (TTC) located in the field is responsible for utilizing their ATIP partner for technology transfer in their Area. OTT-HQ is responsible for coordinating ATIP activities across the Areas. Until the TTL position was created, OTT-HQ did not have adequate resources to effectively coordinating ATIP across ARS. It is expected that this position will be foundation for reorganizing how ARS “markets” its technologies and research capacities. We expect that ATIP will play a leading role in these technology transfer activities.

- Cooperative Research and Development Agreement's (CRADA) Statements of Work and their review process was streamlined for more efficient and effective National Program Staff approval. By discovering issues and addressing them early in the process, the total negotiating time is significantly reduced.

- A list of ARS scientist and engineers based upon their scientific research expertise was created. This list will be used internally within ARS to more efficient identify the appropriate researcher for collaborative projects with ATIP and NIFA-SBIR commercial partners, as well as other outside parties (see USDA-8 below).

- A number of different consortium agreements with ARS and multiple public and private sector partners were developed. The ARS partners in these agreements include both foreign and US entities. Negotiation of these agreements is complex due to divergent IP ownership and policy issues. These consortium agreements define the technology transfer strategy for the collaborative research which is required before the teams can apply for funding.

- A series of in-person talks and webinars with University Cooperative Extension specialists were held to enlist their support for holding the listening session component of ARS-ATIP Rural Agriculture and Business Innovation Forums (see USDA-7 below). One of the roles of Extension is in community and economic development. In this role, they have direct contact with the local government officials, businesses and farmers/ growers/ ranchers within the community. This connection would greatly improve the quality and efficiency Forum listening sessions.

- Worked with the Eureka program of NIST to created Merwyn Business Simulation reports for ARS technologies that are in the public domain. The reports will be uploaded to the NIST National Innovation Marketplace web site. Many ARS research results are in the public domain and this is a novel way of reaching the private sector with "free" technology.

- An ongoing series of discussions was begun between OTT and ONP to develop specific technology transfer strategies for each of the research programs. The results of specific research program may require a unique technology transfer strategies. For example, a large animal vaccine may require a patent and a license to a large business; while the creation of new plant germplasm may require public access. By knowing the technology transfer strategy for a specific research program, one can be proactive in developing the appropriate partnerships for transfer solutions to stakeholders.

- An agreement with CAB International was developed to provide public domain data from ARS to their Plantwise Knowledge Bank. Plantwise collects and makers available on the web valuable data on the identification, distribution, and control of plant pests/diseases. This data, harnessed effectively, can form this basis of an early warning system alerting the plant health community to a change in distribution of existing pests/diseases or the threat of a disease in a new region.

- The ARS Partnering website and the brochure "Forming Partnerships with the Agricultural Research Service" (https://www.ars.usda.gov/sp2UserFiles/Place/01090000/Partnership%20Brochure.pdf) were updated.

3.6. ARS response to Presidential Memorandum on Accelerating Technology Transfer and Commercialization of Federal Research in Support of High-Growth Business

In the USDA's implementation plan for the Presidential Memorandum, ARS described 13 initiatives to promote technology transfer and commercialization. Most of the initiatives described in this plan will begin in FY 2013; however several of the initiatives were already in place in FY 2012. The initiates and their implementation in FY 2012 are described below.

USDA 1: New metrics proposed for standard annual reporting in addition to those required by Circular A-11 instructions on annual reporting of technology transfer

Over the past few years, ARS has added tabular metrics beyond those required by OMB Circular A-11 instructions for annual reporting to Congress as part of the President's budget submission. In response to this Presidential Memorandum, ARS initiated several new performance metrics (Table 3) above those already reported in the Annual Report on Technology Transfer, and formalized those that had been added voluntarily. These metrics will enhance our ability to better monitor partnerships with small businesses, and/or quantify some activities specific to USDA technology transfer.

Table 2. New metrics included in the standard annual reporting in addition to those required by Circular A-11 instructions on annual reporting of technology transfer.

General TT Activities	CRADA-related	Invention / Patent-related	License-related	Partnership intermediary-related (ATIP)
# plant varieties released	# of small business CRADA partners	# of jointly owned inventions / patents with universities	# of small business licenses	# companies reviewing inventions available for licensing
# of germplasm requests and amounts distributed	# of CRADAs modified with an expanded research plan (reflects a measure of satisfaction by private sector partner)	# of jointly owned inventions / patents with small entity owners	# joint inventions licensed to university co-owners	# CRADAs and licenses facilitated by PIA partners
# of Material Transfer Research Agreements (MTRA; new agreement)	# of personnel employed on CRADA research funds	# of Patent Cooperation Treaty applications filed	earned royalty income received from commercial sublicensees reported by university co-owners	# of transactions facilitated by ATIP member (includes entrepreneurship school engagements, tours of facilities, presentations to potential USDA partners, etc.)

Provide examples of significant technology transfer outcomes (transactions) that did not involve a patent and license	# of CRADAs by subcategory • with private sector • with universities • with governments (state / federal) • with multiple parties			

USDA 2: Update Policy and Procedure (P&P) 141.2 "Technology Transfer in ARS"

An update is necessary to reflect statutory changes since 2000, and to reflect changes in structure and operation of Invention Disclosure Review Committees, licensing of biological materials, and use of intermediaries. ARS's Program Leadership Team (PLT) is taking holistic look at technology transfer in ARS. The PLT believes that conducting high quality research will have little impact without a robust and broad technology transfer program. They are currently redefining the roles of the Office of Technology Transfer, Line Management, and the Office of National Programs in technology transfer. Once the roles are defined, a new P&P will written.

USDA 3: Expand Agricultural Technology Innovation Partnership (ATIP) efforts to enhance access of complementary assets to partners of USDA

ATIP members provide the current or prospective private sector partners of ARS with access to business mentors, entrepreneur schools, and seed and venture funds (see ATIP FY2012 accomplishments described above).

The Wisconsin Security Research Consortium in collaboration with the University of Wisconsin at Oshkosh used technologies developed by both ARS and FS to provide real life entrepreneurial experiences in the University's business classes. Students conducted market research and developed business plans that could be used by companies to commercialize the USDA technologies.

USDA 4: Expand outreach efforts of Office of Technology Transfer (OTT) to scientists and engineers in ARS

A series of fact sheets were developed that helped scientists and engineers navigate the principles and policies concerning industry partnerships. Created a monthly newsletter (USDA-ARS Grantsmanship Times) that provides updates to researchers on finding funding, forming partnerships and collaborations; preparing and submitting grant proposals; intellectual property management strategy; and new ARS initiatives, policies and procedures. These facts sheets and Newsletters were posted on a newly created Partnerships and Grants SharePoint site.

The number of users visiting the Partnerships and Grants SharePoint site increased from a total of 228 in 2011 to 427. Of these, 279 are scientists, 14 are agency leadership, 35 ONP staff, and 64 program/agreement support staff.

Began the development of a series of training events organized by ARS National Program rather than

general training by geographic area. This approach will result in more robust technology transfer approaches tailored to the agricultural industry sector served by the scope of the national program. For example, training to the scientists working on human nutrition and development of more nutritious foods will differ in partnership approaches from training of scientists working in water and soil management. Held the first discipline oriented (insect biocontrol) training that included both OTT and Office of National Program staff.

USDA 5: Encourage other S&T agencies to adopt OTT's approach to technology transfer

This initiative will be begin in FY2013 and will require leadership of the USDA Chief Scientist through her Council composed of the USDA science agencies. The result would be a "one USDA" approach to policies and procedures of technology transfer. Consequently, USDA would be able to provide more uniform nurtured relationships for common customers and stakeholders of agencies in USDA.

Provided input to FAS on the development of international ATIP-like organizations to help developing countries to create the infrastructure required to efficiently and effectively provide to their farmers and businesses innovations and technology-based solutions to their agricultural problems. In FY2013, a series of workshops will be held in the US and Egypt to implement an ATIP like structure in Egypt.

USDA 6: Explore expanded use of Enhanced Use Lease authority as technology transfer tool to promote longer term relationships with key customer groups

Enhanced Use Lease (EUL) is an authorization that allows non-government entities to access and invest in underutilized federal facilities, and in exchange for their investment, can lease the facility for up to 30 to 50 years at fair market value. The length of the lease varies by specific congressional authorization. ARS currently has EUL pilot authority for only for the Beltsville Area. ARS developed a policy and procedure (P&P) for using EUL strictly as a technology transfer tool; no other agency with EUL authority (e.g., VA, DoD, NASA) has used it in this manner. The EUL authority expired. We are waiting for renewed authority in the new Farm Bill.

USDA 7: Beginning in FY 2012 / 2013, roll out a nationwide series of regional forums to identify issues and deliver solutions

Our ATIP Partner, Maryland Technology Development Corporation (TEDCO) established the Rural Business Innovation Initiative (RBI^2) program to enhance commercialization activities and provide technical and business assistance to small early-stage, technology-based companies in the rural areas of Maryland as defined by the Rural Maryland Council. Through this program, TEDCO and USDA-ARS partnered to hold a number of regional events, called "Maryland Rural Agriculture and Business Innovation Forums." The goal of these forums was to provide to rural farmers and businesses innovations and technology-based solutions to their regional agricultural problems. The forum approach entailed several steps: (1) A series of regional listening sessions comprised of businessman, farmers, economic development, regulatory and extension personnel were held to identify a broad list of regional issues. (2) From the list of rural issues, TEDCO and ARS selected those issues that were related to agriculture and had an existing research-based solution, or represented researchable issues that could be addressed by ARS. (3) ARS & TEDCO selected a smaller group from those that attended the first listening session for an in-depth discussion of the vetted list of rural issues. (4) Based upon the in-depth discussion, the forum was convened as a roundtable discussion to address the topic issues with farmers, agri-business

professionals, university and ARS researchers, extension service personnel, rural development personnel, NIST-MEP, and funding and regulatory agency personnel.

The goal of this initiative is roll out the forums nationwide. One forum has held in MD on Aquaculture and Water Management. Two forums were held in OH for specialty crops farmers and food producers. These forums are described in detail in the ATIP FY2012 accomplishments described above.

USDA 8: Provide opportunities for applicants to the USDA Small Business Innovation Research (SBIR) program to partner with ARS scientists to further develop science necessary for business success

This initiative is operated jointly with NIFA, who manages the SBIR program for USDA. This initiative includes both funded and unfunded SBIR applications. SBIR applicants (post award announcements) would be provided with information on partnering with ARS, and would receive information from the ATIP Foundation and the ATIP member proximal to applicant to help facilitate partnering with ARS.

In FY2012, OTT and SBIR created letters that were sent to ARS CRADA partners and SBIR applicants. In the one letter, ARS encouraged their CRADA partners to submit SBIR grant proposals. In the other letter, SBIR encourage their FY2012 applicants that needed research expertise to contact ARS for help.

USDA 9: Provide Cooperative Research and Development Agreement (CRADA) partners opportunity to link to local MEP resources to assist in commercialization efforts

This initiate will begin in FY2013. In partnership with NIST MEP, all CRADA partners of ARS would be provided local / regional MEP service provider for consultation on issues of scal-up and product improvement.

USDA 10: Partner with the University of Mississippi's "Insight Park" for extraction, chemical analysis, and scale up of natural products for production agriculture and pest / pathogen / disease vector management

This initiative would directly address Section 4 of the Presidential Memorandum in establishing joint partnerships with university research parks, incubators, and other state / community economic

development organizations. Similarly, such efforts could be piloted at ARS facilities should an expansion of EUL authority be granted to USDA. DoD's Armed Forces Pest Management Board, and the Office of National Programs, USDA ARS, have identified development of next generation insect repellents as the priority project.

A three way CRADA was signed to combine the research expertise of ARS in entomology and the University in chemistry with a small business to develop a new biobased pesticide. The small business submitted an USDA-SBIR proposal on this research. Once the SBIR research is accomplished, the University's incubator facility will be used for commercial scale up.

USDA 11: Partner with the National Cancer Institute (NCI) on "Enhancing translation of nutrition science from bench to food supply"

At an escalating pace, scientific discovery reveals multiple approaches with the potential for exploration and eventual application to benefit society. At the same time, human, financial, and natural resources are severely constrained. This initiative is directed at developing public / private partnerships with the federal science agencies and food industry to translate research outcomes into the food supply. Joint USDA / NCI sponsored workshops have established priorities.

Discussions with the ATIP Foundation and Foundation of the National Institutes of Health were held to determine how these organizations might be able to support the initiative. More extensive discussion will be held to develop a plan on how these foundations may be able to obtain funds to support the initiative.

USDA 12: Evaluate various options for reducing license negotiation transaction costs

The Licensing Section is currently reviewing several proposals for establishing standard pre-commercialization license terms for all CRADA Subject Inventions. The possible benefits include: creating business certainty for CRADA partners; providing an additional incentive to enter into a CRADA with ARS; and reducing transaction costs for both the CRADA partner and ARS.

There are, however, some serious considerations to this proposal. For example, some inventions have much greater market potential than others and would therefore ordinarily command larger license fees. If standard terms are applied to all inventions regardless of the size of the potential market, then the standard payment amounts must necessarily be sufficiently low to be reasonable for smaller market opportunities. This may result in a reduction in license revenues over time. Because technology transfer is an unfunded mandate, ARS uses license revenues to help support technology transfer activities, including the payment of patent filing and maintenance costs, negotiation of CRADAs and other collaborative research instruments, training of scientists and engineers, etc. Consequently, a reduction in license revenues would negatively impact ARS technology transfer efforts broadly. Therefore, proposals for the establishment of standard pre-commercialization license terms for all CRADA Subject Inventions will be evaluated based on both effectiveness in reducing transaction costs and impact on projected future license revenues. Several different models were developed for further evaluation.

USDA 13: Develop Material Transfer Research Agreement (MTRA) as a new instrument to promote development and commercialization of materials from USDA

USDA scientists create new materials that may have value in further research and development with the private sector. Current Material Transfer Agreements (MTA), widely used by USDA, only allow the transfer of materials, but not engagement in joint research between the provider and the recipient of the materials. This new agreement will serve as the authorization to conduct some joint research on the materials transferred. Because this instrument would not convey rights to negotiate exclusive licenses to any intellectual property arising from the research, it is intended as an early stage opportunity for proof of concept that may lead to more extensive research that would be conducted under a CRADA.

The MTRA was created by combining the Material Transfer Agreement and the Trust Fund Cooperative Agreements authorities. MTRA templates were created and integrated into the agreement process.

3.7. Metric Tables

Table 3. Collaborative Relationships for Research and Development (R&D)

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
1	**● CRADAs, total active**	230	233	262	275	243
2	- Newly executed	69	69	83	78	53
	▪Amendments[1], newly executed	76	74	91	91	82
3	▪ Traditional CRADAs, total active	202	191	208	190	180
4	- Newly executed	63	51	59	57	39
7	▪ Non-traditional CRADAs, total active	28	42	54	85	63
8	- Newly executed	6	18	22	21	14
	▪ Material Transfer - CRADA, total active	3	10	16	29	14
	- Newly executed	1	7	10	10	8
	▪ Master, total active	1	1	1	1	1
	- Newly executed	0	0	0	0	0
	▪ Multiple Cooperators, total active	12	15	18	32	34
	- Newly executed	3	5	7	9	3
5	▪ Small Business Cooperators, total active	ND	ND	ND	ND	125
6	- Newly executed	ND	ND	ND	ND	20
	▪ Foreign Cooperators, total active	12	16	19	23	14
	- Newly executed	2	6	5	2	3
	● Other Collaborative R&D Relationships					
	▪ Confidentiality Agreements, newly executed	270	251	246	309	317
	▪ Material Transfer Agreements, newly executed	884	784	885	1038	970
	-Outgoing materials	648	550	633	672	661
	▪ Material Transfer Research Agreements, total active	ND	ND	ND	ND	12
	- Newly executed	ND	ND	ND	ND	12
9	**▪ Other Agreements[2], total active**	5,466	9,960	11,214	13,007	13,835
10	- New executed	1,729	1,381	1,273	1,525	1,119
	● Publications, total	13,996	11,300	11,459	11,260	10,450
	-Peer-Reviewed Scientific Publications	6,335	5,085	5,083	5,279	5,027
	-Trade Journal Publications	104	96	79	83	86
	-Abstracts	4,669	3,943	4,076	3,773	3,582

[1] Amendments extend existing CRADAs for additional years to a maximum of 5 years, and/or change Statements of Work, and/or change funding levels.

[2] Includes mostly Trust Fund Cooperative Agreements, Reimbursable Agreements, Material Transfer Research Agreements, Specific Cooperative Agreements and Non-Funded Cooperative Agreements.

Table 4. Invention Disclosures and Patenting

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
11	**● New invention disclosures in FY, total**	100	141	131	126	137
	-University-ARS Co-owned in FY, total	35	35	42	22	66
12	**▪ Life Sciences**	50	60	68	61	59
	-University-ARS Co-owned	17	17	24	13	21
12	**▪ Chemical**	40	52	36	36	53
	-University-ARS Co-owned	13	13	11	3	13
12	**▪ Mechanical & Measurement**	8	25	24	28	14
	-University-ARS Co-owned	4	4	4	5	4
12	**▪ Plant Cultivars**	2	6	5	7	17
	-University-ARS Co-owned	1	1	3	1	11
13	**● Patent applications filed in FY, total**	114	117	106	110	108
	▪ Non-Provisional	74	86	73	96	56
	▪ Provisional	40	31	32	37	29
14	**● Patents issued in FY, total**	27	21	42	46	60

Table 5. Profile of Active Licenses

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
16	● All licenses, total active in FY	315	316	323	337	363
17	-New, executed in the FY	27	25	22	33	31
	-Newly executed to small business	ND	ND	ND	ND	15
19	-Total executed to small business	ND	ND	ND	ND	118
	-Newly executed to universities	ND	ND	ND	ND	12
	-Total executed to universities	ND	ND	ND	ND	142
	▪ Patent licenses, total active in FY	291	288	292	301	321
	-New, executed in the FY	23	21	18	27	25
	▪ Material transfer licenses, total active in FY	24	28	31	36	42
	- New, executed in the FY	4	4	4	6	6

Table 6. Income Bearing Licenses

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
36	**● All income bearing licenses**	313	314	321	335	360
37	- Exclusive	223	222	230	239	259
38	- Partially exclusive	20	20	16	16	14

39	- Non-exclusive	70	72	75	80	87
44	▪ **Patent licenses**	289	286	290	299	318
45	- Exclusive	220	218	226	234	252
46	- Partially exclusive	20	20	16	16	14
47	- Non-exclusive	49	48	48	49	52
48	▪ **Material transfer licenses**	24	28	31	36	42
49	- Exclusive	3	4	4	5	7
50	- Partially exclusive	0	0	0	0	0
51	- Non-exclusive	21	24	27	31	35
	● **All royalty bearing licenses**[1]	112	129	125	130	128
	▪ Patent licenses	104	120	113	119	114
	▪ Material transfer licenses	8	9	12	11	14

Table 7. Licensing Management: Elapsed Execution Time

Ref #	Agricultural Research Service (ARS)	FY 2008[1]	FY 2009[2]	FY 2010[3]	FY 2011[4]	FY 2012[5]
63	● **All licenses**					
64	- average (months)	4.8	6.7	6.6	5.9	5.8
	- median (months)	5	6.8	6.4	3.3	4.2
65	- minimum (months)	0.5	0.7	0.7	0.6	0.3
66	- maximum (months)	11.4	18.4	18.5	18.2	19.7
	- Exclusive and partially licenses					
	- average (months)	7.3	9.7	5.7	10.3	10.4
	- median (months)	6.6	7.9	5.6	9.9	8.6
	- minimum (months)	3.9	5.5	2.3	5.1	4
	- maximum (months)	11.4	18.4	9.2	18.2	19.7
	- Non-exclusive licenses					
	- average (months)	2.3	3.2	8.3	2	2.8
	- median (months)	1	1.8	9.4	2	2.1
	- minimum (months)	0.5	0.7	1	0.6	0.3
	- maximum (months)	6	8	18.5	3.3	8.1
	▪ **Patent licenses**					
67	- average (months)	7.2	8.2	6.1	8.6	8.4
	- median (months)	6	7.3	5.6	6.2	7.3
68	- minimum (months)	3.9	1.2	2.3	1	0.5
69	- maximum (months)	11.4	18.4	11.9	18.2	19.7
	- Exclusive and partially exclusive patent licenses					
	- average (months)	7.3	10.1	5.3	11.3	10.4
	- median (months)	6.6	8.4	4.8	13.5	8.6

	- minimum (months)	3.9	5.5	2.3	5.1	4
	- maximum (months)	11.4	18.4	9.2	18.2	19.7
	- Non-exclusive patent licenses					
	- average (months)	6	1.3	11.9	1.9	1
	- median (months)	6	1.3	11.9	1.9	0.6
	- minimum (months)	6	1.2	11.9	1	0.5
	- maximum (months)	6	1.4	11.9	2.3	2.1
	▪ Material transfer licenses					
	- average (months)	1.8	4.4	7.6	2.6	3.5
	- median (months)	0.6	4.7	8.5	2.3	2.9
	- minimum (months)	0.5	0.7	1	0.6	0.3
	- maximum (months)	5.8	8	18.5	5.4	8.1
	- Non-exclusive material transfer licenses					
	- average (months)	1.8	4	7.4	2.1	3.5
	- median (months)	0.6	3.7	5.3	2	2.9
	- minimum (months)	0.5	0.7	0.7	0.6	0.3
	- maximum (months)	5.8	8	18.5	3.3	8.1
	● Licenses terminated for cause, total					
71	▪ Patent licenses	0	0	0	0	0
	▪ Material transfer licenses	0	0	0	0	0

[1] During FY 2008, USDA received 30 new invention license applications, for which 7 new licenses were granted, 20 license agreements are currently in negotiation, 5 applications were withdrawn by the applicant. The FY2008 data is based upon 16 licenses granted to commercial licensees and does not include licenses executed with universities for co-owned inventions. In accordance with 35 USC 202(e) such licenses are granted for the purpose of consolidation rights in the invention, and therefore license applications are not required.

[2] During FY 2009, USDA received 31 new invention license applications, for which 7 new licenses were granted, 14 license agreements are currently in negotiation, 5 applications were withdrawn by the applicants, and 5 applications are on hold by request of the applicants. The FY 2009 data is based upon 15 licenses granted to commercial licensees and does not include licenses executed with universities for co-owned inventions. In accordance with 35 USC 202(e), such licenses are granted for the purpose of consolidating rights in the invention, and therefore license applications are not required.

[3] During FY 2010, USDA received 24 new invention license applications, for which 4 new licenses were granted, 16 license agreements are currently in negotiation, 3 applications were withdrawn by the applicants, and 1 application is on hold by request of the applicant. The FY 2010 data is based upon 14 licenses granted to commercial licensees and does not include licenses executed with universities for co- owned inventions. In accordance with 35 USC 202(e), such licenses are granted for the purpose of consolidating rights in the invention, and therefore license applications are not required.

[4] During FY 2011, USDA received 29 new invention license applications, for which 4 new licenses were granted, 21 license agreements are currently in negotiation, 0 applications were withdrawn by the applicants, and 4 applications are on hold by request of the applicant. The FY 2011 data is based upon 13 licenses granted to commercial licensees and does not include licenses executed with universities for co-owned inventions. In accordance with 35 USC 202(e), such licenses are granted for the purpose of consolidating rights in the invention, and therefore license applications are not required.

[5] During FY 2012, USDA received 16 new invention license applications, for which 7 new licenses were granted, 9 license agreements are currently in negotiation, 0 applications were withdrawn by the applicants, and 0 applications are on hold by request of the applicant. The FY 2012 data is based upon 18 licenses granted to commercial licensees and does not include licenses executed with universities for co-owned inventions. In accordance with 35 USC 202(e), such licenses are granted for the purpose of consolidating rights in the invention, and therefore license applications are not required.

Table 8. License Income

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
72	**● Total income, all active licenses**	$3,953,415	$5,376,463	$3,641,476	$3,989,228	$3,806,164
73	▪ Patent licenses	$3,883,922	$5,318,483	$3,566,048	$3,854,820	$3,670,692
	▪ Material transfer licenses	$69,493	$57,980	$75,428	$134,408	$135,472
	▪ Other IP Licenses	$0	$0	$0	$0	$0
	● Total Earned Royalty Income (ERI)	$3,009,774	$4,422,023	$3,075,199	$3,136,813	$3,059,989
75	- Median ERI	$4,258	$4,485	$4,911	$4,748	$5,000
76	- Minimum ERI	$7	$12	$2	$6	$44
77	- Maximum ERI	$761,553	$1,715,890	$331,674	$630,847	$757,219
78	- ERI from top 1% of licenses	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]
79	-ERI from top 5% of licenses	$1,657,059	$2,756,811	$1,493,456	$1,932,197	$1,752,367
80	- ERI from top 20% of licenses	$2,543,565	$3,874,292	$2,540,101	$2,672,414	$2,604,008
	▪ Patent licenses, total ERI	$2,982,281	$4,386,042	$3,014,771	$3,067,390	$2,969,517
87	- Median ERI	$4,579	$4,612	$5,000	$4,800	$5,000
88	- Minimum ERI	$45	$117	$2	$6	$44
89	- Maximum ERI	$761,553	$1,715,890	$331,674	$630,847	$757,219
90	- ERI from top 1% of licenses	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]
91	- ERI from top 5% of licenses	$1,544,031	$2,756,811	$1,493,456	$1,855,388	$1,752,367
92	- ERI from top 20% of licenses	$2,485,319	$3,819,292	$2,485,208	$2,628,537	$2,529,658
	▪ Material transfer licenses, total ERI	$27,493	$35,980	$60,428	$69,423	$90,472
	- Median ERI	$1,003	$3,186	$1,705	$2,000	$2,844
	- Minimum ERI	$7	$12	$42	$37	$82
	- Maximum ERI	$9,508	$13,690	$17,988	$22,867	$27,847
	- ERI from top 1% of licenses	$9,508	$13,690	$17,988	$22,867	$27,847
	- ERI from top 5% of licenses	$9,508	$13,690	$17,988	$22,867	$27,847
	- ERI from top 20% of licenses	$18,573	$21,282	$32,711	$42,241	$59,075
	▪ Total ERI from Universities					$643,542

[1] Represents a single license.

Table 9. Disposition of License Income

Ref #	Agricultural Research Service (ARS)	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012
105	● Income distributed, total	$3,013,522	$3,673,922	$3,137,670	$3,220,920	$3,550,930
106	- To Inventors	$756,458	$1,371,346	$1,370,296	$1,391,111	$1,206,713
107	- To Others	$562,427	$1,633,536	$1,179,579	$1,181,859	$1,686,521
108	▪ Patent licenses, total	$2,958,996	$3,631,660	$3,084,726	$3,202,394	$3,474,591
109	- To inventors	$729,892	$1,346,512	$1,341,289	$1,343,366	$1,152,848
	- Salaries of some technology transfer staff	$1,535,437	$1,616,108	$1,155,642	$1,166,333	$1,664,047
	- Patent filing preparation, fees, & annuity payments	$694,667	$669,040	$587,795	$647,950	$657,696
	- Other technology transfer expenses	$0	$0	$0	$0	$0
	▪ Material transfer licenses, total	$54,556	$42,262	$52,944	$63,271	$76,339
	- To inventors	$27,566	$24,834	$29,007	$47,745	$53,865
	- Salaries of some technology transfer staff	$26,990	$17,428	$23,937	$15,526	$22,474
	- Patent filing preparation, fees, & annuity payments	$0	$0	$0	$0	$0
	- Other technology transfer expenses	$0	$0	$0	$0	$0

3.8. Downstream Outcomes

Sustained Food Production

- 361 Research Projects
- 71 Locations
- 777 Scientists

Cover Crop Residue Conserves Soil Moisture and Enhances Weed Control And Grape Vine Root Growth

Cover crops have been shown to improve soil structure and weed control. It was unknown which cover crop practices are best suited for young vineyards in the Pacific Northwest. ARS scientists and collaborators at Oregon State University examined five different vineyard floor management schemes. One included the use of winter cover crop residue grown in alleyways as mulch within vine rows in a young vineyard. The use of the mulch in the vine row increased vine shoot and root growth, suppressed numerous weeds, reduced soil compaction, and maintained higher soil moisture over two growing seasons, as compared to a clean-cultivated control without mulch. The findings suggest that the use of cover crop residues as a mulch can improve vine establishment and conserve soil resources and soil quality when establishing new vineyards in the Pacific Northwest region. *Horticulture Crops Research Lab, Corvallis, OR*

Brown Marmorated Stink Bug Working Group

ARS researchers initiated formation of the Brown Marmorated Stink Bug (BMSB) Working Group. This group brings together research personnel from USDA, ARS and Land Grant Universities from over 10 states as well as extension personnel, stakeholders, industry representatives, and regulatory officials from the USDA, APHIS and the EPA. This group has formulated research, extension, and regulatory priorities for the BMSB and coordinated collaborative projects aimed at developing effective monitoring and management tools for this invasive species. *Appalachian Fruit Research Station, Kearneysville, WV*

Nitrogen Alters Cold Hardiness of Nursery Trees

Stem and bud dieback due to winter injury causes economically important losses in nursery tree production and it is unknown whether plant nitrogen status or the type of fertilizer used influences cold hardiness. Using deciduous bareroot nursery trees, ARS researchers, and university collaborators

determined that both nitrogen rate and nitrogen form influenced the cold tolerance of buds and stems of nursery trees. Trees with a similar nitrogen status withstand different levels of cold depending on the rate or form of fertilizer used during production. When developing nutrient management strategies for nursery production of trees in climates prone to winter injury, fertilizer component selection is an extremely important factor that growers should consider. *Horticulture Crops Research Unit, Corvallis, OR*

Early Detection of the Onset of Crop Stress for Effective Crop Production Management

Hyperspectral imaging provides a technique for great potential for early detection of crop injury. A visible near infrared hyperspectral imaging system was successfully employed by ARS researchers in collaboration with Geosystems Research Institute of Mississippi State University, to determine herbicide-induced crop response to glyphosate applied at different application rates. Use of this system will allow the determination of the specific spectral bands that indicate onset of crop stress due to herbicide induced damage, nutrient deficiency, and water deficiency. *Crop Production Systems Research Unit, Stoneville, MS*

Research on Bee Feed Demonstrates Effects on Bee Health

Beekeepers feed high fructose corn syrup or sucrose to colonies as a carbohydrate source when flowering plants are not available; protein is fed when pollen is scarce. ARS scientists demonstrated that colonies fed during the winter with sugar syrup made with sucrose had greater brood production in the spring compared with colonies fed high fructose corn syrup. A high rate of brood production in the spring is important for building strong colonies for the pollination of early season crops such as almonds. Similarly, ARS scientists in Baton Rouge, Louisiana, found that continual feeding of protein and sugar syrup and feeding protein enriched with pollen in mid- winter produces colonies that far exceed the sizes needed for almond pollination. This effect is enhanced if beekeepers use eight-frame equipment. *Carl Hayden Bee Research Center, Tucson, AZ*

Improved Techniques and Protocols for Spray Applications in Pest Control

Effective control of mosquitoes and other insects that vector human diseases requires precise spray application techniques. New technologies are needed to efficiently monitor the dispersal of very small droplets over large sampling areas and to evaluate the efficacy of insecticide treatments using caged insects in the field. ARS researchers established the collection efficiency of two commonly used rotary slide spray samplers under multiple wind speeds and spray droplet sizes and developed correction factors that estimate actual spray droplet size and aerial concentration. The research also established the impact of insect bioassay cages on airspeed, spray droplet size, and spray concentration inside the cages, and developed correction factors that estimate actual spray concentration presented to caged mosquitoes. The sampling techniques and protocols developed by this research provide major advancements in the predictive value of laboratory and field test data that guide real world spray application for control of major pest and disease-transmitting arthropods. *Areawide Pest Management Research Unit, College Station, TX*

Tools Developed for Tracking and Understanding Colony Collapse Disorder

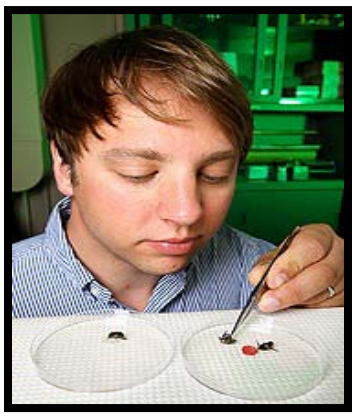
Efforts to improve bee health have suffered from an inability to accurately assess disease caused by viruses and other pathogens. ARS scientists have improved methods for collecting honey bees from representative populations, shipping them for genetic analyses, stabilizing and extracting RNA, conducting high-throughput genetic screens for viruses and other pests, collecting embryos from established colonies, and carrying out controlled experiments on adult bees. These methods are being used in national surveys in the United States in order to establish cell lines and other genetic techniques and to better determine interactive effects. *Bee Research Laboratory, Beltsville, MD*

Ovicidal and Neonate Activity of Insecticides Demonstrated for Navel Orangeworm

Almonds are the largest California nut crop, with greater than 1.7 billion pounds produced annually. However, production and nut quality can be severely affected by the navel orangeworm (NOW) caterpillar. Optimal insecticide levels for NOW moth eggs and larvae have not yet been established for newly registered insecticides in almonds. ARS researchers showed that two new classes of

insecticides, anthranilic diamide and diacyl hydrazine are toxic to NOW eggs and newly hatched larvae, with up to a 97 percent kill rate. Their use will replace broad spectrum insecticides and they are compatible with pheromone-based strategies that disrupt moth mating. As these new insecticides have ovicidal activity and are more selective than broad spectrum insecticides currently used, their use would result in improved navel orangeworm control with reduced non-target effects. *Commodity Protection and Quality Research Unit, Parlier, CA*

Japanese Beetles, a Key Pest of Horticultural Crops, Paralyzed by a Chemical from Zonal Geranium



The Japanese beetle is a highly destructive plant pest that can be very difficult and expensive to control. Adults attack the foliage, flowers, or fruits of more than 300 different ornamental and agricultural plants. Zonal geraniums have been known since the 1920s to be toxic to Japanese beetles; however, until recently the chemical responsible for the toxicity remained unknown. ARS researchers isolated and identified quisqualic acid from flower petals of zonal geranium and demonstrated its role in paralyzing adult Japanese beetles. This discovery will provide a new line of plant-derived and synthetic chemical controls for Japanese beetles and possibly many other important insect pests. *Application Technology Research Unit, Wooster, OH*

New Genes for Lethality in Fruit Flies

Mass releases of sterile males are a widely used means to control pest fruit flies, but the radiation that sterilizes males often damages their sexual performance. Conditional-Lethality, where a released insect's offspring die when certain environmental conditions prevail, is a promising substitute for traditional sterility. A successful conditional-lethality strain for the Caribbean fruit fly was created that survives on a diet supplemented with an antibiotic, tetracycline, but suffers 100 percent embryonic lethality in the absence of the antibiotic. The genes involved will serve to improve the efficacy of control programs that protect U.S. agriculture from not only fruit flies but also from other potentially invasive insect pests. *Insect Behavior and Biocontrol Research Unit, Gainesville, FL*

High Speed Wind Tunnel Supports Aerial Application Industry

Modern aerial application aircraft make spray applications at speeds up to 220 MPH, which exceeds the capability of current wind tunnels used to develop spray models. ARS researchers developed a new high-speed wind tunnel testing facility capable of generating airspeeds in excess of 220 MPH, and developed and implemented testing protocols for the new wind tunnel. This facility has already been utilized to extend the airspeed range of the ARS spray atomization models, including the first-ever documented

atomization data for U.S. Air Force C-130 aircraft spray application at airspeeds exceeding 200 MPH. These new high-speed models are critical in helping aerial applicators make effective spray applications that meet regulatory requirements and that are in full compliance with agrochemical product use labels. *Areawide Pest Management Research Unit, College Station, TX*

Comprehensive Application Technology and Strategy to Reduce Pesticide Use

Pesticide applications are critical to ensure healthy, unblemished ornamental nursery plants. Conventional spray application practices recommend the modification of carrier volume for preparations of spray mixtures, but not the amount of active ingredients per unit area. ARS researchers demonstrated that growers could use their existing spray equipment to reduce pesticide and water use by 50 percent by properly changing spray nozzles at no extra cost and still achieve effective pest and disease control. This equates to doubling the pesticide application efficiency while reducing pesticide costs, reducing health risk to applicators, and diminishing adverse impact to the environment. Other benefits accrued with this approach included increased operational efficiency (the area sprayed is doubled thus the frequency and travel time required for the tank refilling times are reduced) and reduced costs for energy consumption and new equipment, as well as reduced risk of pesticide exposure of workers. By using the half-rate practice, growers reported savings of over $200-$500 per acre. *Application Technology Research Unit, Wooster, OH*

Potential Major Cause of Reproductive Failure in Beef Cattle Found

Feed and care for unproductive cows that fail to achieve pregnancy is a major cost in beef Production. A test capable of identifying young cows with low likelihood to conceive and produce a live calf would have a substantial impact on the efficiency of beef production. During a study to identify genes producing variation in reproductive efficiency, ARS researchers discovered that as many as 30% of cows that had low success achieving pregnancy appeared to carry portions of the male-specific Y chromosome. Since only bulls are expected to have the Y chromosome, this research suggests transmission of Y chromosome to female offspring (via a chromosomal crossover event) may be a significant contributor to reproductive failures. This discovery will now be used to develop a test that identifies beef heifers and cows which should not be used for breeding. A robust test for Y

chromosome in beef cattle breeding herds that improves reproductive efficiency will lead to improved reproductive efficiency and lower production costs that will increase economic returns to producers, lower beef prices, and enhance beef exports. *Genetics, Breeding and Animal Health Research Unit, Clay Center, NE*

Replacing Antibiotics in Young Swine Feed with Natural Alternatives

Antibiotics have been fed at sub-therapeutic levels as health, growth, and efficiency promoters for more than 50 years and much of the swine produced in the United States receives antibiotics in their feed at some point during the production process. However, because of concerns over antibiotic resistance, alternatives to antibiotics are a high priority for United States swine producers. ARS researchers determined that feeding a natural antimicrobial agent called lysozyme to young pigs consuming a liquid diet was as effective as antibiotics in increasing growth performance, improving gastrointestinal health, and decreasing pathogen shedding in feces. This natural antimicrobial agent is a suitable alternative to antibiotics for young pigs consuming manufactured liquid diets. The identification of suitable alternatives to antibiotics will enable the swine industry to effectively transition away from dietary antibiotic use. *Nutrition Research Unit and Meat Safety & Quality Research Unit, Clay Center, NE*

A Salmon Line for Faster Growth and Greater Weight

Increasing harvest size and reducing the time to harvest of Atlantic salmon are two goals of the salmon producers in North America. Commercial salmon producers in the United States utilize stocks that are not many generations removed from wild, unselected stocks and are legally required to culture stocks certified to be of North American origin. ARS researchers evaluated the growth of salmon from their breeding program in commercial sea cages in collaboration with industry. A salmon line selected for faster growth and greater weight was produced and germplasm was released to commercial producers. Utilization of improved germplasm will reduce the time to harvest, increase the profitability and sustainability of coldwater marine aquaculture in the United States, and provide a quality seafood product to U.S. consumers. *National Cold Water Marine Aquaculture Center, Franklin, ME*

Alternative Feeding Ingredients

Prices of soybean meal and corn, the two most commonly used traditional feed ingredients in channel catfish diets, have increased dramatically in recent years. Using less-expensive alternative feed ingredients to partially replace soybean meal and corn will reduce feed cost. ARS scientists investigated

the use of corn gluten feed and cottonseed meal, two promising alternative feedstuffs, as replacements for soybean meal and corn in diets for pond-raised channel catfish. The study showed that a maximum of 50% of the soybean meal in channel catfish diets may be replaced (soybean meal was reduced from 51.4% to 25.7%) by a combination of corn gluten feed and cottonseed meal (up to 20% of each in the diet) without markedly affecting the physical quality of feed pellets, fish growth, processed yield, and body composition. Results are being used by catfish feed mills to reduce feed costs while providing a nutritionally complete feed for commercial catfish farming. *Thad Cochran National Warmwater Aquaculture Center, Catfish Genetics Research Unit, Stoneville, MS*

Ovine Progressive Pneumonia in Sheep

Ovine progressive pneumonia is an incurable, slow-acting, wasting disease that affects the health and productivity of millions of U.S. sheep. It is also one of the most costly sheep diseases in the world. ARS researchers have discovered a gene that protects sheep from this disease and collaborated with a company to provide a genetic test for breeding better sheep. As a consequence, producers can improve health and increase profitability of their sheep by selecting those that are less susceptible to infection. *Genetics, Breeding, and Animal Health Research Unit, Clay Center, NE*

Dramatic Production Improvements through Pond Oxygen Management

Dissolved oxygen is the most critical water quality parameter in warm water aquaculture but controlled studies of the impact of this diurnally-fluctuating parameter on channel catfish have been lacking. ARS researchers examined the impact of pond dissolved oxygen (DO) concentrations on catfish growth, yield, food consumption, and food conversion. A computer-controlled pond oxygen monitoring system maintained precise DO set-points. Results showed that for optimum food conversion and growth, DO levels of 2.5 to 3.0 mg/L are required and this is higher than common practice for the industry. With higher levels of DO, improved growth will significantly shorten the production cycle and reduce fish losses to all causes, significantly improving food conversion. Increased growth resulting from improved DO management can reduce food conversion ratios (weight of feed input/fish weight gain) from an estimated industry-wide 2.5-3 to 2, reducing production costs by $0.10-0.20/lb., greatly improving the profitability of catfish farming. *Thad Cochran National Warmwater Aquaculture Center, Catfish Genetics Research Unit, Stoneville, MS*

High Speed Sorting of Grains

New technologies have been developed for automated separation of seeds that are discolored, blemished, infected by fungi, or from different species such as wild grass seed from noxious weeds. This technology uses a "smart" camera developed by an ARS researcher. The camera enables high speed image capture and digital processing of images from each individual seed as they drop off the end of a chute. This camera has been integrated into a complete sorting system. Seeds are separated by a short burst of air from an air nozzle placed near the falling stream of seeds. For wheat, the system has a throughput of approximately 20Kg/hr. and has been used extensively by breeders and seed foundations for separating red and white wheat classes, scab damaged wheat, and removal of other crop seeds, such as barley from wheat. The image can be used to identify small blemishes on seeds that are not large enough to be detected by traditional color sorters. While the throughput of the image based system is not as large as commercial color sorting machines, the cost is much lower, making the technology accessible to most seed breeders and seed foundations. The technology has been commercialized through a Cooperative Research and Development Agreement. *Engineering and Wind Erosion Research Unit, Manhattan, KS*

Economical Proactive Solutions to Invasive Fruit Fly Threats

Foreign fruit flies (for example, the Mediterranean fruit fly) that attack a wide range of fruits threaten US agriculture. Periodically they are discovered in fruit producing states like California and Florida. Until they are eradicated after discovery (which may take years) fruit may not be shipped out of quarantined areas, resulting in economic loss. Also, lack of economical treatments encourages smuggling, which carries a high-risk of invasive species. Research on these flies in the countries where they are found is costly and slow. An ARS scientist proposed developing treatments at the Food and Agriculture Organization of the United Nations/International Atomic Energy Agency laboratories in Austria where any foreign fruit fly may be brought in and reared by comparison with species for which treatments are already available. That quick and economical method using resources and personnel from various countries has developed treatments for invasive flies, thus, providing solutions to quarantine barriers to trade. *Stored Product Insect Research Unit, Manhattan, KS*

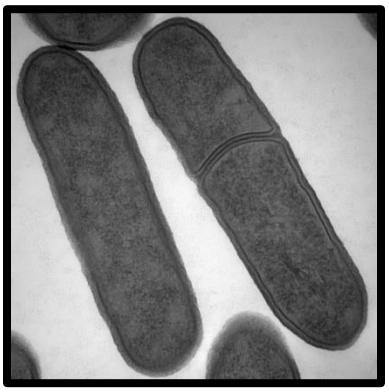
Broad Treatment Solutions to Invasive Species Threatening Trade

The US is a major equipment supplier and user of irradiation to safely disinfest traded commodities of invasive pests. An ARS scientist is a key player in a large international effort coordinated by the United Nations Food and Agriculture Organization and the International Atomic Energy Agency to develop broad irradiation treatments that cover most commodities and pests, thus removing numerous barriers to trade in US exports and imports. This is being accomplished at little cost to the ARS and the US as most of the research is done elsewhere. Currently over 20 thousand tons of fresh fruits and vegetables are traded using this technology with the amount, number of commodities, and countries involved steadily increasing. *Stored Product Insect Research Unit, Manhattan, KS*

Management of Psocid Pests of Stored Products

Psocids, or booklice have become important pests of stored products in the U.S. in the last decade, but we know little about them. ARS scientists are investigating their biology and control to acquire information to help stored-product industries, such as flour mills and warehouses make decisions about psocid management. These are very small insects, usually less than 1 mm in length, which makes them difficult to identify. Most people had assumed that psocids only develop at high humidity or in wet grain, but scientists have showed that some species of psocids developed fastest at lower relative humidity. It was also assumed that psocids can't feed on whole grain, but studies show that they feed on and damage whole grain. Heat is being used more often to disinfest flour mills and studies show psocids are susceptible to heat. All insecticides registered for stored wheat, rice, and corn in the U.S. were tested for effectiveness against psocids. Research shows the organophosphate class of insecticides was most effective for psocid control. This information is helping managers of stored product facilities make better pest management decisions. *Stored Product Insect Research Unit, Manhattan, KS*

Detection of a Novel Pathogen of Farmed Rainbow Trout and Potential to Control by Vaccination



An ARS Researcher isolated a novel Gram-positive bacterial pathogen causing significant loss of farmed rainbow trout in North Carolina. The pathogen identified was similar to the *Weissella* sp. Strains associated with recent disease outbreaks in farmed rainbow trout in both China and Brazil and represents the first report of this pathogen in the US. In response to a request from North Carolina Stakeholders, Dr. Welch developed and validated an effective autogenous *Weissella sp.* Vaccine that can be delivered by injection. The *Weissella sp.* Vaccine was shown to be effective when mixed with another vaccine that is currently used in North Carolina thus showing that these vaccines can be

delivered together minimizing the increased production costs and negative effects caused by multiple injections. Early pathogen detection and rapid development and implementation of this vaccine will aid control efforts and reduce the likelihood of further pathogen dissemination in the US. *National Center for Cool and Cold Water Aquaculture, Kearneysville, WV*

Tick Vaccine Candidates

Significant progress was made toward evaluating vaccine candidates selected through a science-based approach intended to deliver a tick vaccine that will elicit an immune response protecting cattle from cattle fever tick infestations. A patent application covering two novel vaccine antigens discovered in this project has been filed. Sufficient vaccine antigen for 200-head field trials for three antigens was prepared, including the two covered by the patent application. A vaccine trial to evaluate the immune response of white-tailed deer vaccinated with two vaccine candidate antigens, including one of the antigens covered in the patent application, is in its final stages. Three additional vaccine candidate antigens have been successfully produced and are available for small group cattle trials. A productive partnership with stakeholders and collaborators from the animal health industry resulted in plans to deliver a tick vaccine for the Cattle Fever Tick Eradication Program. *Tick & Biting Fly Research Unit, Kerrville, TX*

Cattle Fever Tick Eradication

Cattle fever ticks that transmit the potentially fatal Texas fever, or bovine piroplasmosis, to cattle were declared eradicated from the U.S. after a nationwide campaign lasting from 1907 to 1943. This was possible to a large extent because of minimal to non-existent populations of white-tailed deer that could not be treated and would have acted as alternate hosts for the ticks. The campaign to prevent ticks from being reintroduced across the border from Mexico continues today; however, populations of white-tailed deer have drastically increased, and as alternate hosts they are compromising eradication effort. Currently, deer are being self-treated as they are attracted to bait in treatment stations, however, feral swine, 68avelin, and raccoons are damaging the feeders, consuming the bait, and preventing deer from being treated for ticks. The short electrified exclusion fence described in this paper has been shown to be essentially 100% effective in preventing the unwanted animals from accessing the bait stations while allowing free access by deer, thus dramatically increasing the efficiency, efficacy, and economy of treatments. *Livestock Insects Research Laboratory, Kerrville, TX*

Red River Runner Peanut Variety Released

RED RIVER RUNNER (RRR) is the latest high value peanut variety released by the USDA-ARS peanut breeding program at the Plant Science Research Unit in Stillwater, Oklahoma. Cooperators on this variety release include Texas AgriLife Research and Oklahoma State University. RRR offers producers in the Southwestern U.S. three qualities necessary in a peanut variety for sustainable production: high-oleic fatty acid oil content, high yield, and superior grade. Beyond those important traits, RRR also offers moderate resistance to Sclerotinia blight, a fungal disease of peanut which can result in devastating yield and profit loss for producers. The superior grade potential of RRR is certainly the trait that makes peanut producers desire its production. In trials conducted in Oklahoma and Texas, RRR, when compared to all other runner varieties grown in the Southwestern U.S., averaged a significantly higher return by $80/acre or more. RRR is quickly becoming the most highly coveted runner peanut variety grown in the Southwestern U.S. with production limited only by seed availability. *Wheat, Peanut and Other Field Crops Research, Stillwater, OK*

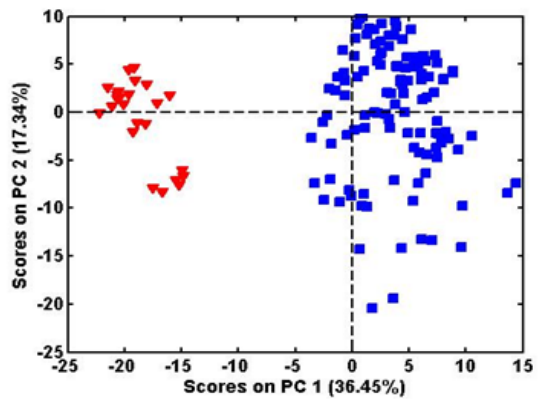
Efforts to Control Horn Flies

Horn flies are a serious and economically significant pest of cattle. Efforts to control horn flies using chemical pesticides are increasingly difficult due to development of pesticide resistance in fly populations. Diazinon is a member of the organophosphate (OP) class of pesticides that disrupts the fly nervous system by targeting the enzyme acetylcholinesterase (AchE). Diazinon-resistant flies were previously shown to contain a mutation (G262A) in AchE predicted to alter the structure of the enzyme so that it would be less sensitive to OP insecticides. A new study used recombinant DNA technology to clone and express a recombinant form of the horn fly AchE with and without the G262A mutation to characterize biochemical properties of the horn fly AchE enzyme and the effects of the G262A mutation. Results of the study determined the biochemical properties of the horn fly AchE and confirmed that the G262A mutation significantly reduced sensitivity of the enzyme to OP insecticide. This study substantiates previous work and suggests that two additional AchE mutations may also contribute to insecticide resistance in horn flies. Elucidation of the mechanisms of fly resistance will allow development of rapid tests to identify mutations present in fly populations that will help guide selection of effective means of pest control. *Livestock Insects Research Laboratory, Kerrville, TX*

Food Safety and Nutrition

- 107 Research Projects
- 19 Locations
- 258 Scientists

Fingerprinting Identifies Plants



Principal component analysis (PCA) applied to NIR reflectance spectral fingerprints for 2 species of ginseng; ■ American (*Panax quinquefolius*) and ▼ Asian (*Panax ginseng*).

ARS Scientists have developed methods to generate fingerprints of plant chemical constituents and metabolites that identify plants with 100% accuracy. Examples using the method included green tea and ginseng; different species and growing locations were determined with a relatively easy to perform assay. This has application for regulatory agencies to identify the type of plants used in processed foods and dietary supplements in addition to discovering adulteration or misbranding of products. *Food Composition Laboratory, Beltsville, MD*

Maternal Obesity Affects Energy Metabolism in Offspring

It is known that children of obese mothers are more likely to be obese. While shared behaviors contribute to this observation, there are inherited biological differences that also affect energy balance. Using a rat model of obesity, ARS-supported scientists found that obesity in mothers led to epigenetic changes in some genes, dysfunction of the mitochondria, organelles that control energy metabolism in the cell, and to impairment of burning fatty acids for fuel. These data help explain how and why maternal obesity can be passed on to offspring who are more likely to develop obesity, insulin resistance, and nonalcoholic fatty liver disease. *Department of Pediatrics, University of Arkansas for Medical Sciences, Little Rock, Arkansas; Department of Pharmacology and Toxicology, University of Arkansas for Medical Sciences, Little Rock, Arkansas; Department of Physiology and Biophysics, University of Arkansas for Medical Sciences, Little Rock, Arkansas; and Arkansas Children's Nutrition Center, Little Rock, AR*

Continuous Monitoring of the Nutritional Content of Common U.S. Foods

Monitoring the nutritional content of the U.S. food supply has been a USDA priority since 1891. The nutrient data compiled by this USDA program is used as the basis for national and international food policy decisions that link food or nutrient intake to health or disease risk and is also the basic data used for many private food databases. ARS researchers from Beltsville, Maryland, have released the 24th version of the National Nutrient Database for Standard Reference. In addition to a focus on 7,500 foods and up to 140 nutrients, a special interest database on flavonoid content of foods was released that will allow researchers to study the potential health benefits of these compounds found in fruits, vegetables, tea, and cocoa. These databases will update nutritional assessment of the U.S. food supply and will ensure that nutritional policy is made using the most up-to-date information. *National Data Laboratory, Beltsville, MD*

Nanoparticles to Inactivate Foodborne Pathogens

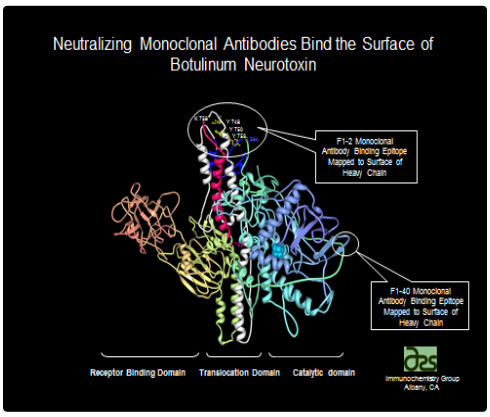
Nanoparticles can be effective antimicrobial agents against foodborne pathogens. ARS researchers investigated the antimicrobial activities of two nanoparticles (magnesium oxide and zinc oxide) against three major foodborne pathogens: Escherichia coli O157, Salmonella spp, and Campylobacter jejuni. The results demonstrated that these nanoparticles dramatically killed those pathogens and, therefore, potentially can be added directly in foods or incorporated in packaging materials to improve microbiological safety. This research explores a new application of nano-technology and inorganic antimicrobial compounds in the food safety area, and provides useful information to the food and packaging industries. The impact of nanoparticles on environment and human health is not clear. Currently nanotechnology is being evaluated in the Food and Drug Administration Critical Path Initiative. Further toxicological studies are needed to determine the potential risks to humans which is a concern expressed by various international bodies. *Residue Chemistry and Predictive Microbiology Research Unit, Wyndmoor, PA*

Pharmacokinetics of Perfluorooctanoic Acid

Perfluorooctanoic acid (PFOA) is a “nonstick” compound used in many industrial, commercial, and consumer products. Due to its extensive use, PFOA is widely found in humans, wildlife, and the environment. Cattle are exposed to PFOA while grazing in contaminated areas, but the extent to which PFOA accumulates in their meat is not known. ARS researchers together with scientists at USDA-FSIS, conducted a study to determine to what degree PFOA concentrates in the edible tissues of

beef cattle and whether this may be a concern for human exposure. Beef cattle were fed a single dose of radiolabeled PFOA which could easily be tracked in the animals. The PFOA was quickly excreted in animal's urine and no detectable amounts were left in the animals after 8 days. This study showed that PFOA was not likely to accumulate in beef and that consumption of beef should not be a significant source of exposure to PFOA. *Animal Metabolism-Agricultural Chemicals Research Unit, Fargo, ND*

Neutralization of Botulinum Neurotoxin



Clostridium botulinum neurotoxins (BoNTs), responsible for botulism food poisoning, are rapidly absorbed in small amounts. Even though lethal they are concomitantly very difficult to detect. Scientists developed monoclonal antibodies specific for BoNTs and tested them for their ability to provide protection against botulism exposure in a mouse model system. Following intravenous and oral exposures to lethal levels of toxin, the timing of antibody neutralization of the toxin was determined. The results provided new information on the toxicity of BoNTs and revealed windows of opportunity for human therapeutic treatment with antibody. A better understanding of the biology of toxins, the factors that affect their toxicity and toxin neutralization are valuable tools for advancing food safety and defense. *Foodborne Contaminants Research Unit, Albany, CA*

Organic Acids Reduce Salmonella in Swine and Poultry

Salmonella bacteria are human pathogens that can reside in the gut of food animals such as swine, cattle, and poultry; these bacteria can contaminate meat products reaching the consumer and thus cause illness or even death. Organic acids are a dietary additive that can improve animal growth efficiency and change the microbial population of the intestinal tract. ARS researchers demonstrated that including specific organic acids in the diets of pigs and chickens could reduce populations of Salmonella from 10 to 100 fold in the live animals. This work has important food safety implications because it identifies another tool to help producers reduce the carriage of foodborne pathogens in meat-producing animals. Reduced pathogen loads in animals at slaughter will result in microbiologically safer meat products reaching the consumer. *Food and Feed Safety Research Unit, College Station, TX*

Irrigation Pipelines as Microbial Reservoirs

In a primary study on the impact of biofilms, ARS scientists showed that pathogen and indicator microorganisms associated with biofilms on internal pipe walls could alter the microbial quality of irrigation water used to produce fresh produce. This study showed that it is imperative to monitor water quality at fields, rather than just at the intake. This study strongly suggests that back-flushing the irrigation system or disinfecting irrigation pipelines have to be considered as viable management practices

by producers to improve the safety of irrigated produce. Such decisions would have to be included within produce related good agricultural practices (GAPs). *Environmental Microbial and Food Safety Laboratory, Beltsville, MD*

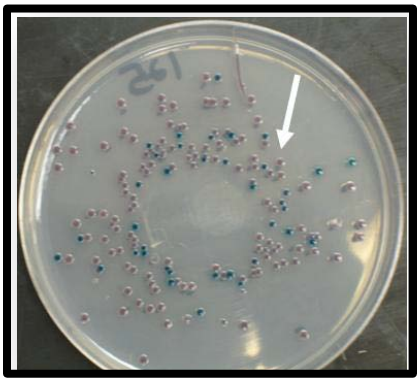
Sites of Virus Persistence in Shellfish

Virus contamination of shellfish has led to frequent outbreaks of hepatitis A and norovirus illnesses. Once contaminated, shellfish retain high levels of these viruses for extended periods. ARS researchers identified primitive blood cells of oysters, known as hemocytes, as the site of virus accumulation and persistence. Research led to the development of simple and effective procedures to extract and test for viruses within the hemocytes. This technology is a dramatic improvement over traditional testing methods for viruses in shellfish which rely on tedious dissection and testing of intestinal tissues that contain only a portion of the viral contaminants. Improved assay methods will significantly enhance monitoring efforts and support regulatory agencies such as the Food and Drug Administration and the Centers for Disease Control. *Food Safety and Intervention Technologies Research Unit, Dover, DE*

Host Response to Campylobacter in Poultry

Food-poisoning bacteria such as Campylobacter are significant causes of human disease; these
pathogens can often be found as contaminants in poultry meat products. New non-antibiotic therapeutics are needed to reduce or prevent colonization of poultry by these harmful bacteria; which will largely translate into pathogen-free meat products reaching the consumer. ARS scientists used modern molecular biological techniques (microarray analysis and real-time RT-PCR) to define gene expression changes in the avian spleen during an active Campylobacter infection. This work is the first to develop a solid foundation for defining the complex mechanisms involved in innate immunity of poultry to Campylobacter infections, and in Campylobacter adaptation to the intracellular environment. The work has broader impact in that it provides a valuable means for accessing unique information on host-pathogen interactions. More definitive understanding of these molecular mechanisms will facilitate development of new and more effective intervention strategies for minimizing or even eliminating the occurrence of food-borne pathogens in commercial poultry. *Food and Feed Safety Research Unit, College Station, TX*

Reducing the Risk of Pathogenic *E. coli* in Beef



The agar plate is used to confirm the identity of one of the newly regulated *E. coli* strains.

The beef industry has been dealing with *E. coli* O157:H7 since 1994. Now six additional strains of *E. coli*, that produce Shiga-toxin like *E. coli* O157:H7, have been identified as a potential risk to human health and are regulated in certain beef products. ARS scientists have provided the beef industry with three important findings that will help them in their battle against these pathogens. First, they determined that the antimicrobial interventions currently used by the beef processing industry against *E. coli* O157:H7 work equally well against these new *E. coli* strains. Secondly, numerous commercial testing companies were racing to develop tests that would enable industry to accurately, quickly, and affordably identify whether their products contain any of these six strains of *E. coli*. To assist industry with testing, scientists identified genetic markers that are currently being used in commercial rapid tests to accurately identify these strains of *E. coli*. Lastly, scientists evaluated all the new pathogen tests coming to market to provide industry with accurate information about how well each of them worked. *Meat Safety and Quality Research Unit, Clay Center, NE*

Natural Resources and Sustainability

- 167 Research Projects
- 71 Locations
- 519 Scientists

New Decision Tool Targets Rangeland Erosion to Save Money and Conserve Soil

Soil erosion from agricultural lands and deposits of sediment into rivers and lakes is a persistent environmental challenge that costs the United States over $6 billion every year. In collaboration with ARS scientists in Boise, Idaho, and Tucson, Arizona, and scientists at the Great Basin Rangelands Research Unit in Reno, Nevada developed a new soil prediction tool for rangelands that helps land managers to predict long-term soil loss after individual storms. This new tool provides a way for land managers to predict where erosion will occur, and provides a way to assess the possible effectiveness of different conservation practices before soil degradation 2 occurs. The tool has been adopted by the Natural Resources Conservation Service and is being used to evaluate existing conservation programs and how they can be enhanced and improved deliver of conservation in a more cost-effective manner by targeting areas of concern. This research contributes to the USDA Conservation Effects Assessment Project for western rangelands. *Great Basin Rangelands Research Unit, Reno, NV*

Accurate Cost and Risk Estimates for Fencing Rangeland Pastures

One of the most common management practices used on rangelands is subdividing pastures by adding additional fences to provide flexibility for increasing grazing intensity to uniformly use pastures. ARS scientists in Cheyenne, Wyoming and Fort Collins, Colorado, in cooperation with the Environmental Defense Fund, determined how fencing materials and installation costs, longer-term maintenance costs, and the influence of Farm Bill financial incentives affect financial risk to the land manager. Researchers estimated livestock stocking rates would need to be increased 9-16% over twenty years to maintain break-even conditions. These increased stocking rates could reduce the health of rangelands and decrease animal and plant productivity. This kind of integrated science and policy analysis is necessary to determine the most economic options for achieving realistic conservation outcomes based on the actual grazing capacity of the rangeland. *Rangeland Resources Research Unit, Fort Collins, CO and Cheyenne, WY*

New Gene Inserted in Alfalfa Could Save Dairy Producers $100 Million Annually

More efficient food production will be required to meet increasing demands by a growing population. Reducing protein nitrogen losses in dairy operations is one strategy to improve production efficiency. ARS researchers identified a novel red clover enzyme and transferred the gene that encodes this enzyme to alfalfa. If red clover phaselic acid protection can be reconstituted in alfalfa, it is estimated that improved protein and nitrogen utilization would save farmers more than $100 million annually by reducing the need for purchased supplemental feed proteins. Improved efficiency could also substantially reduce nitrogen waste from cattle on dairies which would end up in surface and ground waters. Plants with higher levels of phaselic acid may also be more resistant to ultraviolet light and ozone pollution stresses, as well as stresses from insect pests and plant pathogens. *U.S. Dairy Forage Research Center, Madison, WI*

Herbicide Volatilization Exceeds Herbicide Runoff Losses

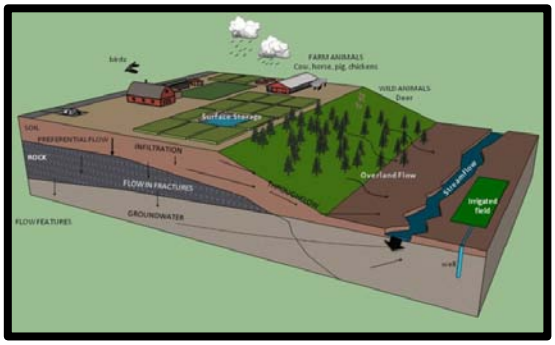
Surface runoff was thought to be the major off-site transport mechanism for herbicide. However, until recently no field investigations monitored both surface runoff and turbulent volatilization fluxes simultaneously. An 8-year, field-scale experiment was conducted where herbicide (atrazine and metolachlor) volatilization and surface runoff losses were simultaneously monitored and evaluated. Results demonstrate that regardless of weather conditions, volatilization losses consistently exceeded surface runoff losses. Surprisingly, herbicide volatilization losses were up to 25 times larger than herbicide surface runoff losses. The research will affect USDA and USEPA policy with regard to herbicide behavior and the data will be used to develop or improve pesticide behavior models. *Hydrology and Remote Sensing Laboratory, Beltsville, MD and National Laboratory for Agriculture and the Environment, Ames, IA*

Environmental Impacts of Biofuel Feedstock Production Systems

The Energy Independence and Security Act of 2007 mandates increased production of energy from alternate fuel sources such as biomass. ARS Researchers used field data from biofuel feedstock plots in the central and eastern US to verify the ability of a commonly used computer model called DAYCENT to represent the ethanol yields and greenhouse gas emissions for different crops. They then used the model to quantify yields and greenhouse gas emissions for lands currently used for corn

ethanol production and to project yields and emissions if this land was converted to cellulosic ethanol production using perennial crops. Results suggest that if land currently used for corn ethanol production were converted to perennial crops, ethanol production could increase from 7 to 12 billion gallons while greenhouse gas emissions from soil would decrease by approximately 400%. These finding are critical for efficient energy production from plant feedstocks for the United States. *Soil Plant Nutrient Research Unit, Fort Collins, CO*

Mathematical Model for Pathogen Transport and Retention



Existing mathematical models to simulate the movement of pathogens through agricultural soils and groundwater do not provide reliable predictions even under relatively simple, well defined conditions. Researchers at USDA-ARS and the University of California at Riverside have developed a mathematical model for pathogen transport and retention. The model provides a clear conceptual explanation for many incompletely understood observations of pathogen transport and retention in soils, and helps to identify areas where additional research and theory development are still needed. This information will be of interest to scientists and engineers concerned with predicting the fate of pathogens in soils and aquifers. *United States Salinity Laboratory, Riverside, CA*

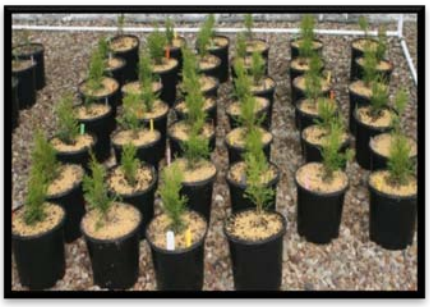
Climate Change and the U.S. Western Rangelands

As the greenhouse gas carbon dioxide (CO_2) continues to increase in Earth's atmosphere and temperatures rise, many are moving beyond wondering about the possibility of climate change to considering what its consequences will be. Answers to this question relevant to the wide expanses of US western rangelands are beginning to emerge in a unique field experiment which is evaluating the combined effect of higher CO_2 and temperatures on native mixed-grass prairie. The news is not all bad. While the warmer temperatures of future environments will tend to dry out these already dry grasslands, the higher CO_2 concentrations may off-set, at least temporarily, this negative effect of warming through improved plant water use efficiency. As a result, productivity in the next few decades in many western rangelands may remain relatively unchanged from current levels. However, there is also evidence that several invasive plant species, including Dalmatian Toadflax, diffuse knapweed, and Cheatgrass, may be favored under future climatic conditions, adding to the growing concern that invasive plants are becoming increasingly difficult to control in many western rangelands. Results suggest that weed invasions may be a high-priority area for developing adaptive management strategies to deal with climate change on rangelands. Results are being used by modelers and other climate change scientists to forecast the impact of climate change on ecosystems around the world, and are being featured in national and international climate change assessments. *Rangeland Resources Research Unit, Cheyenne, WY and Fort Collins, CO*

Release of a Tall-Statured Forage Kochia, Snowstorm

Winter feeding can account for 50 to 70% of the yearly input costs for livestock production in the western United States. Extending grazing into the fall and winter on western rangelands increases the sustainability of livestock and wildlife. Winter grazing of rangeland grasses, however, does not meet minimum protein requirements for ruminant livestock. Grazing of rangeland shrubs helps meet this protein requirement, but most shrubs are not palatable and/or are covered by winter snow pack. Forage kochia is a drought and salt resistant perennial shrub that remains green and succulent during the heat of the summer, and on snowy days, the leaves and stems provide a high protein snack for cattle and wildlife. However, the only previously released "Immigrant" forage kochia is short-statured at 10-16 inches and is often covered by snow. The USDA collected (Uzbekistan), bred for the past 10 years, and recently released a tall-statured forage kochia, "Snowstorm" at 24-36 inches that provides cattle and wildlife with more abundant highly digestible forage with higher protein. *Forage and Range Research Laboratory, Logan, UT*

Wheat Straw as an Alternative to Pine Bark in Container Substrates



ARS researchers engineered an effective substrate composed primarily of locally produced wheat straw to replace imported pine bark in nursery container substrates. Pine bark is currently used as the primary potting substrate in the nursery industry, but its cost is increasing, its availability is decreasing, and it must be transported over long distances from the southern United States. ARS scientists developed a new potting substrate comprised primarily of wheat straw and low levels of pine bark. On-farm trials have shown that these substrates are effective in a variety of production systems. Adoption of these substrates would reduce dependency on pine bark imported from distant southern states; using instead locally sourced wheat straw biomasses for nursery crop substrates. *Application Technology Research Unit, Wooster, OH*

Clear Invasive Eastern Red Cedar to Produce Jet Fuel

Eastern red cedar trees are native but have invaded formerly productive eastern Great Plains rangeland over the past 100 years due to fire exclusion and other human activities. ARS scientists have developed a remote sensing technique to accurately estimate the amount of red cedar biomass in Oklahoma that can be harvested. Working with NRCS, the team estimates that the 12 million tons of red cedar growing in the 17 highest impacted counties is enough to produce 800 million gallons of biofuel or 9-million megawatt hours of electricity. Clearing the red cedar will also restore the rangeland productivity for native wildlife habitat and cattle grazing.

Commercial business developers are proposing to use this feedstock resource and are pursuing capital to build a first-of-a-kind jet fuel biorefinery in Oklahoma. The accomplishment is also a contribution to the western and northwestern regional USDA Biomass Research Centers. *Forage and Livestock Production Research Unit, El Reno, OK*

New Energy Cane Variety Developed

ARS scientists and their collaborators have developed a new sugarcane variety with fiber-rich stalks that could help set the stage for producing biofuels from cellulose. Millions of acres of dedicated feedstocks will need to be produced to help meet legislated biofuel targets, and energy cane is one of the crops that will be needed for the southeastern region of the United States. The new cane variety *Ho 02-113* was bred with biofuel use in mind, and is one of four high-fiber varieties that have been released in anticipation of biorefinery needs for Gulf-Coast specific crops. *Ho 02-113* produces dense stands of high-fiber stalks, making it more adaptable to a wider range of environments than typical cane intended for sugar production. In addition to being able to produce new growth from un-harvested stalk material, it also survived natural outbreaks of brown rust, smut, leaf scald and mosaic disease. ARS researchers publically released *Ho 02-113* in cooperation with Louisiana State University and the American Sugar Cane League. This effort is a product of the Southeastern Regional USDA Biomass Research Center. *Sugarcane Research Unit, Houma, LA*

Rapid Estimation of Cellulosic Ethanol Yield

ARS and the Near Infrared Spectrophotometry Consortium (NIRSC) established a cooperative agreement for transferring switchgrass composition NIRS calibrations to public and private laboratories and industries developing switchgrass as a biofuel biomass crop. The NIRSC is an association of commercial analysis laboratories, universities, government agencies, plant research companies, and instrument companies that collaborate to develop standardized NIRS methods, and disseminate information about the accuracy and application of NIRS technologies. ARS scientists led this new effort that has provided a rapid method to mass screen the quality of switchgrass genetic lines for improved performance, and for biorefiners to accurately assess the expected ethanol yields from biomass produced across a wide range of production field conditions. This effort is a product of the Central-East Regional USDA Biomass Research Center. *Grain, Forage and Bioenergy Research Unit, Lincoln, NE*

Corn Gene Enhances Switchgrass Biofuel Production

ARS scientists have increased starch production in switchgrass by up to 250 percent using a novel form of the corn gene *cg1* (*corngrass1*). Starch produced by *cg1* switchgrass was converted into simple sugars such as glucose and without energy-intensive and expensive pretreatment of biomass. Moreover, *Cg1* switchgrass does not produce seeds or pollen, thus preventing the inadvertent movement of this gene by pollen to native switchgrass populations, thus protecting natural sources of genetic variation. The *cg1* switchgrass represents a new model to genetically improve feedstocks for the biofuel production industry. The research collaboration is between ARS scientists, the Department of Energy, Energy Biosciences and Joint BioEnergy Institutes. This effort is a product of the Central-East Regional USDA Biomass Research Center. *Plant Gene Expression Center, Albany, CA*

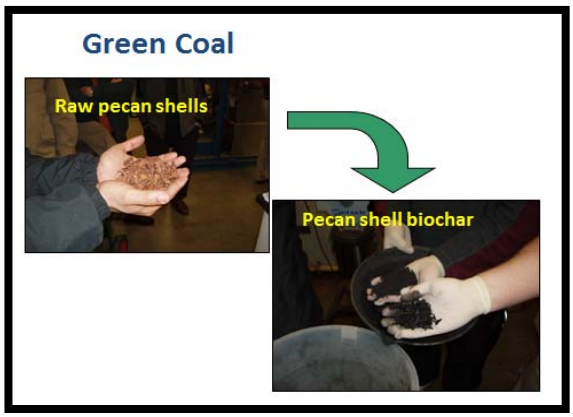
Novel Bacteria for Wastewater Treatment

Investigators discovered a novel bacterium having the characteristics of oxidizing ammonia and releasing nitrogen gas under anaerobic conditions. The novel bacterial strain *Candidatus Brocadia caroliniensis* may be used for the treatment of wastewater having undesirable levels of ammonia, including agricultural, industrial, or municipal wastewaters. Compared to conventional biological nitrogen removal methods, this microbial method uses 60% of the energy normally required for aeration and does not require external carbon addition. In addition, by-products do not include greenhouse gases (methane and nitrous oxide). This leads to a significant decrease in operational costs and provides possible environmental credit benefits for the users of this new technology. *Coastal Plains Soil, Water, and Plant Research Center, Florence, SC*

Agricultural Fibers Make Eco-Friendly Packaging

Expanded Polystyrene (EPS) is used to make non-biodegradable protective packaging materials, a $2.2 billion industry. Engineers at Lubbock, TX, discovered optimal blends of agricultural biomasses that maximize performance of 100% biodegradable packaging composites, produced using cooperators technology, which outperformed EPS and opened additional markets for the product. As a result of this research, the agricultural biomass protective packaging material has been successfully evaluated for other uses such as acoustic tiles, insulation panels, furniture cores, and footwear. Several Fortune 500 companies are now using the product. *Cotton Production and Processing Unit, Lubbock, TX.*

Biochars Made from Manures and Crop Residues Improve Soil Carbon Sequestration, Water Storage, Fertility, and Remove Harmful Chemicals



Investigators produced biochars, a charcoal-like product, during carbonization of manure and plant waste materials using both thermal and hydrothermal processing. Both of these processes were optimized to produce biochars with diverse chemical and physical properties. Laboratory research showed that biochars made from nut shells were effective at increasing soil carbon sequestration while biochar made from grasses increased soil water storage. Manure biochars contained plentiful plant nutrients such as nitrogen, phosphorus, and potassium, but were blended with other plant-based biochars to produce a more nutrient balanced fertilizer-like product. Location scientists also discovered that hydrochar, the biochar made from hydrothermally processing poultry litter, can be used as an environmental adsorbent for effectively removing harmful chemicals such as endocrine disrupting chemicals and estrogens. Production of these biochars and their blends leads to an alternative use of agricultural byproducts that can increase soil carbon sequestration and water storage, provide essential plant nutrients and reduce levels of contaminants in soils. *Coastal Plains Soil, Water, and Plant Research Center, Florence, SC*

Biomass Production in Urban Areas

Biomass yield from urban landscapes is an untapped resource. Utilization of urban landscapes for biomass-for-energy production would free agricultural landscapes for food production. In 2007 and 2008, biomass production was estimated from a typical urban landscape in Woodward, Oklahoma. The harvested biomass production included: lawn thatch, lawn clippings, fallen leaves, and tree and shrub prunings. The data suggests that during a high precipitation year it was possible to harvest 6.0-to-8.5 tons of dry biomass from an acre of urban green space and 3.5-to-5.5 tons of dry biomass per acre in a normal precipitation year. Similarly, the City of Woodward, Oklahoma could generate approximately 4,100 tons of dry biomass in a normal rainfall year and about 6,700 tons in a high rainfall year. In the United States, there is an estimated 36 million acres of land cultivated to grasses, trees, and shrubs. At an average yield of 5.0 tons per acre, urban areas in the United States have the potential to generate an estimated 180 million tons of dry biomass. This number could be larger if debris from natural disasters, such as, ice storms, tornados, hurricanes, and floods were added. Lawn clippings, fallen leaves, and tree limbs are all potential sources of biofuels and most cities already collect and transport these materials to disposal/recycling sites. However, if every urban landholder provided their green biomass for energy production; cities could alternatively collect and transport these biomass materials to a local biomass fueled energy conversion plant where they could be used to produce electricity or converted into other energy forms. *Southern Plains Range Research Station, Woodward, OK*

ARS Germplasm Distribution

The National Genetic Resources Program (NGRP) is responsible for acquiring, characterizing, preserving, documenting and distributing to scientist, germplasm of all life forms important for food and agricultural Production. This table lists the number of distributions from each NGRP repository to different organizational categories. Distributions occurred throughout the world.

Repository	Organizational Category												
	UARS	UFED	STA	UCOM	UPRU	UIND	UAID	INT	FGEN	FCOM	FPRU	FIND	Total
BRW	-	-	-	-	-	-	-	-	-	-	-	-	141*
COR	821	3	1252	694	151	1692	0	0	0	19	834	3	5469
COT	1492	0	382	462	2	192	0	2	0	100	180	0	2812
DAV	88	0	6063	230	35	265	0	0	7	15	20	0	6723
GEN	-	-	-	-	-	-	-	-	-	-	-	-	-
GSOR	1373	0	3493	597	278	1769	0	0	0	0	111	150	7771
GSPI	1427	2	1033	101	5	444	0	0	432	35	6038	3	9520
GSZE	1	0	30	1	8	0	0	0	0	0	471	2	513
HILO	-	-	-	-	-	-	-	-	-	-	-	-	8305*
MAY	123	2	23	26	0	3	0	0	6	7	4	1	195
MIA	46	17	91	78	25	276	0	0	0	5	30	0	568
NA	101	2	159	48	7	9	0	0	0	0	9	0	335
NC7	-	-	-	-	-	-	-	-	-	-	-	-	184*
NE9	2016	299	14129	5957	809	1516	0	0	5434	4599	7728	42	42529
NR6	49	8	1330	1538	210	1375	0	0	2649	375	749	90	8373
NSGC	675	0	1077	2279	115	647	0	47	0	26	1115	6	5987
NSSL	13472	16	10687	1547	2448	1116	0	5232	40189	1056	19903	28	95694
NTSL	606	33	245	60	3	4	0	0	15	224	10	24	1224
OPGC	395	0	26	0	0	0	0	0	0	0	0	0	421
PALM	15	3	221	127	14	67	0	0	503	55	96	0	1101
PARL	-	-	-	-	-	-	-	-	-	-	-	-	-
RIV	10	50	41	133	29	119	0	0	6	29	86	0	503
S9	0	0	73	5	0	67	0	0	0	0	18	25	188
SOY	5736	8	10092	6501	204	1613	0	0	6791	5588	3924	16	40473
TGRC	6083	0	12462	8573	49	802	0	0	1764	89	1492	0	13314
W6	-	-	-	-	-	-	-	-	-	-	-	-	6206*
Total	36341	561	67796	30596	4867	15165	0	5562	59304	15237	54876	439	305,580

*These repositories did not distinguish the distribution category.

ARS GERMPLASM DISTRIBUTION KEY

ORGANIZATIONAL CATEGORIES: **FCOM**=Foreign commercial company, **FGEN**=Foreign genebank/resources unit, **FIND**=Foreign individual no affiliation, **FPRU**=Foreign non-commercial organization, **INT**=CGIAR International Agr. Res. Center, **STA**=U.S. state agencies and all universities, **UAID**=US agency for International Development, **UARS**=Agricultural Research Service, **UCOM**=U.S. commercial company, **UFED**=U.S. Federal agency (not ARS or AID), **UNID**=U.S. individual no affiliation, and **UPRU**=U.S. non-profit organization.

REPOSITORIES:

BRW	Natl. Germplasm Repository - Brownwood
COR	Natl. Germplasm Repository - Corvallis
COT	Cotton Collection
DAV	Natl. Germplasm Repository - Davis
GEN	Natl. Germplasm Repository - Geneva
GSOR	Rice Genetic Stock Center
GSPI	Pea Genetic Stock Collection
GSZE	Maize Genetic Stock Center
HILO	Natl. Germplasm Repository - Hilo
MAY	Natl. Germplasm Repository - Mayaguez
MIA	Natl. Germplasm Repository - Miami
NA	National Arboretum
NC7	North Central Regional PI Station
NE9	Northeast Regional PI Station
NR6	Potato Germplasm Introduction Station
NSGC	National Small Grains Collection
NSSL	National Center for Genetic Resources Preservation
NTSL	Forest Service National Seed Lab
OPGC	Ornamental Plant Germplasm Center
PALM	National Arctic Plant Genetic Resources Unit
PARL	National Arid Land Plant Genetic Resources Unit
RIV	Natl. Germplasm Repository - Riverside
S9	Southern Regional PI Station
SOY	Soybean Collection
TGRC	C.M. Rick Tomato Genetics Resource Center
TOB	Nicotiana Collection
W6	Western Regional PI Station

3.9. Technology Transfer Outreach, Workshops, Field Days & Forums

Alabama:

National Soil Dynamics Laboratory (Auburn, AL)

- Hosted 16 students from the National University of Agriculture in Honduras on learning about agriculture systems and practices of the southeastern United States (10/21/2011).

Arizona:

U.S. Arid Land Agricultural Research Center (ALARC), Maricopa

- Hosted 60 irrigation engineering students and faculty from the University of Chapingo, Mexico. Center scientists discussed ongoing research in irrigation modeling, irrigation management, and remote sensing in irrigated agriculture. (11/2011)
- Representatives from the Maricopa Community College District visited and toured ALARC to learn about our research programs and the potential for developing partnership/collaboration with community colleges throughout Arizona. (11/2011)
- Hosted annual Focus Group meeting of industry, university and grower representatives from the local, regional and national level. (11/2011)
- Hosted a visit from the Economic Development Director for the City of Maricopa and representatives of the Canadian Consulate. (11/2011)
- Hosted 30 students and faculty from Estrella Mountain Community College. Provided tour and presented on-going research in agricultural biotechnology. (11/2012)
- Hosted a tour in coordination with 30 members of the Arizona Farm Bureau for the Agriculture Air Quality Task Force-NRCS to learn more about agriculture in the Arizona Region and research being conducted at our center (2/6/2012).
- Hosted the Cotton Incorporated Risk Management Seminar, sponsored by Cotton Incorporated and Calcot Ltd., to discuss Market-based Strategies on “How to manage your Price Risk for the 2012 Crop Season, and Integrate Crop and Revenue Insurance.” About 20 people attended. (2/29/2012).

- Hosted a tour for the Summer Ag Institute, a group of about 30 educators from Elementary and High Schools from all over the State of Arizona. (6/4/2012).
- Hosted tour of ALARC for 40 people in coordination with the City of Maricopa and Arizona BioIndustry Association (AZBio). (7/25/2012).
- Center scientists attended the Maricopa County Community College District – STEM Internship Expo at the Phoenix College located in Phoenix, AZ. (9/29/2012)
- Hosted weekly Seminars providing the agricultural community with a forum for keeping abreast of research developments on a wide range of topics. (10/2011-5/2011)

Southwest Watershed Research Center, Tucson and Tombstone

- Hosted a tour of the Walnut Gulch Experimental Watershed for 16 graduate students from Arizona State University (3/15/2012).
- Outreach event with five of the ranching families operating on the Walnut Gulch Experimental Watershed to show the impact of resear**ch on the watershed to cooperators that allow us to work o**n their land (5/30/2012).
- Hosted three visitors from the University of Talca and the government of Chile for a tour of the Walnut Gulch Experimental Watershed (5/10/2012).
- Hosted 22 undergraduate students from the University of Chapingo URUZA (Unidad Regional Universitaria de Zonas Áridas de la Universidad Autónoma Chapingo) in Bermejillo, Durango for a tour and demonstrations of soil and water management tools and research. (5/10-11/2012).
- Hosted 23 water resource professionals from Germany for the tour of the Walnut Gulch Experimental Watershed (9/29/2012).

Arkansas:

Harry K. Dupree Stuttgart National Aquaculture Research Center (Stuttgart, AR)

- Hosted a delegation from Embrapa, the Brazilian agency counterpart to ARS, and the Office of International Research Programs (6/14-6/15/2012).
- Hosted a Direction Setting Workshop with presentations and a roundtable discussion with fish producers and support industry personnel (8/9/12).

Dale Bumpers National Rice Research Center (Stuttgart, AR)

- Participated in the Annual Rice Field Day at Beaumont, TX by presenting research on improving the mineral nutritional content of rice grain and on optimizing organic rice production methods. Attended by about 200 growers and industry representatives (7/12/2012).
- Participated in the 2012 Rice Expo hosted by the University of Arkansas. Attended by about 1100 people (8/3/2012).

Poultry Production and Product Safety Research Unit (Fayetteville, AR)

- Presented research at the Southern Sustainable Agriculture Working Group Annual Conference and Trade Show in Little Rock. Attended by over 1,200 people (1/19-21, 2012).
- Participated in the Farm Foundations: Planning for Success Workshop in Marshall AR by presenting information on business planning, identifying markets and different marketing strategies for sustainable livestock production. Attended by 60 new and beginning farmers including many military veterans (4/21-22, 2012).
- Participated in the Arkansas Women in Agriculture Annual membership meeting by presenting research and information about the University of Arkansas/ARS Beginning Farmer and Rancher program. Attended by over 200 people (4/27/2012).

Dale Bumpers Small Farms Research Unit (Booneville, AR)

- Hosted a Sheep and Goat Field Day on organic production of small ruminants and control of internal parasites in small ruminants. Attended by 40 producers and extension agents attended (10/8/2011).
- Participated in the Southern Sustainable Agriculture Working Group Annual Conference and Trade Show in Little Rock, AR by presenting research on agroforestry and small ruminants. Attended by over 1200 farmers, ranchers, researchers, and food advocates (1/19-21/2012).
- Participated in the Katahdin Hair Sheep International Expo in Wooster, OH by presenting research on parasite control in sheep. Attended by over 200 producers and industry representatives (8/8-12/2012).
- Participated in the North Carolina State University Precision Agriculture Field Day at Plymouth, NC (6/19/2012) and the North Carolina State University Cooperative Extension Service Field Day at Monroe, NC (6/20/2012) by presenting research on subsurface application of dry poultry litter. Attended by over 200 agricultural producers and extension personnel.

California:

Processed Foods Research Unit, Albany

- Hosted two team meetings with the tomato processing industry in support of research on Development of a Demonstration Infrared Heating System for Tomato Peeling. (8/25/12 and 10/5/12)

Western Regional Research Center (WRRC), Albany

- 25 Representatives from the California Wheat Commission visited WRRC, where ARS data on wheat research were presented. (8/29/12)
- Hosted a weekly Academic Workshop Program was hosted by WRRC researcher Bor-Sen Chiou for 13 students. (weekly in 2012)

National Clonal Germplasm Repository, Davis

- Participated in University of California Picnic Day, where attendees included University staff, students and the public (4/21/12)
- Hosted mulberry and peach tasting at Wolfskill Experimental Orchards (WEO) to Rare Fruit Growers and other stake holders. (6/2/12)
- Hosted a tasting and tour at Wolfskill Experimental Orchards (WEO) for the Culinary Institute of America (CIA). (9/7/12)
- Hosted a fig and grape tasting at Wolfskill Experimental Orchards (WEO) for Rare Fruit Growers and other stakeholders. (9/8/12)

Western Human Nutrition Research Center in Davis, CA

- Hosted or presented at many events to encourage participation in our human studies including UC Davis Picnic Day, Davis Farmers Market, the City of Davis Health and Wellness Day (3/24/12), UCD's Soaring to New Heights event which emphasizes equity and diversity(4/10/12), UCD's Thank Goodness for Staff event (5/9/12), and the UCD Retiree Fair (7/18/12), and the Black Fall Welcome and Chicano/Latino Student Welcome at UC Davis (9/25/12).
- Hosted a visit by Princess Sirindhorn of Thailand and senior government advisors on 5/14/12. The Princess is interested in developing a similar Center in Thailand.
- Hosted an Open House for Stakeholders in conjunction with a Nutritional Phenotyping Symposium held at UC Davis. The Symposium was organized jointly by the WHNRC and the Foods for Health Institute at UC Davis. There were 150 attendees including many stakeholders. (7/11-7/13/12)

- Presented the main research areas and human studies for 30 students and faculty from Nagoya University, Japan on 8/16/12.
- Hosted and held 3 days of research planning with colleagues from institutions in Denmark, who are working with the WHNRC under an agreement with ARS.
- Hosted Dr. Paul Coates from NIH's Office of Dietary Supplements on 5/30/12.
- Organized 2,621 hours of training in the WHNRC Metabolic Kitchen for UC Davis undergraduate interns between 10/1/11 and 7/31/12.

Crop Diseases, Pests and Genetics Research Unit, Parlier

- Hosted a tour of students and faculty from the University of São Paulo - Luiz De Queiroz College of Agriculture in Brazil (2/17/12)
- Hosted a site tour for a group of faculty from the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) in Italy to discuss ACP/HLB management and diagnostics and post harvest disease problems with tree fruits (8/17/12)
- Hosted three California Table Grape Commission research committee meetings. The audience included fruit growers and research committee members for evaluation of advanced table grape selections in the breeding program. (8/8/12; 9/19/12; and 10/19/12)
- Hosted an informational meeting and tour for several representatives of the raisin industry and discussed the raisin breeding program and progress being made in the program. (10/3/12)
- Hosted a group of seven scientists from Yunnan Academy of Forestry, China, with research interests in fruits/nuts trees and forestry. Discussed issues involving pathogen and insect pest control. (10/23/12)

Commodity Protection and Quality Research Unit, Parlier

- Hosted the postharvest phosphine fumigation meeting. The audience included fresh fruits and tree nuts industry people, researchers and chemical company representatives (9/27/2012).
- Hosted the area wide NOW (Navel Orangeworm) project Stakeholder Meeting. The audience included university researchers, extension agents, insecticide company representatives, professional crop advisers and Area Office (10/2/2012).

National Arid Land Plant Genetic Resource Unit, Parlier

- Hosted a booth at the World Ag Expo, Tulare, CA., The World Ag Expo is the largest annual agriculture exposition of innovative agriculture methods, crops and equipment and is attended by people in agribusiness and the general public (2/14-16/2012).
- Hosted a booth at the Fresno Farm and Nutrition Day, Fresno, CA, for students and the general public (3/23/2012).
- Hosted a booth at the Fresno Water-Wise Plant Exchange, Fresno, CA, for home gardeners and the general public interested in replacing regular landscape plants with water efficient ones (5/5/2012).
- Hosted a site tour for a group of the Future Farmers of America interested in agricultural research (4/23/2011).
- Hosted a site tour for a group of staff from Fresno State and the City of Fresno and Cal Trans employees interested in germplasm adequate for drylands to be used for research or to landscape public areas (6/13/12).
- Hosted a site tour for members of the Chukchansi tribe interested in crops adequate to their tribal lands (5/3/12).
- Hosted a site tour site tour for a group of faculty and students from Chile interested in agricultural research in a climatic zone comparable to their main agricultural region (7/27/12).

National Clonal Germplasm Repository for Citrus and Dates, Riverside

- Hosted tours of the Repository and facilities during the University of California Riverside Citrus Day. Two hundred stakeholders were registered. (1/26/2012)
- Hosted eight Friends of Citrus groups with 35-50 stakeholders present. (12/13/2011, 1/12/2012, 2/7/2012, 4/26/2012, 5/8/2012, 6/12/2012, 8/24/2012, 9/25/2012)

Crop Improvement and Protection Research Unit, U.S. Agricultural Research Station, Salinas

- Hosted four scientists and administrators from Xinjiang Academy of Agricultural Sciences, Urumqi, China (10/24/2012
- Hosted Hartnell College Food Safety Course (~ 75 participants) for hands-on field sampling of field irrigation systems and produce cold storage rooms. (10/25/2012)
- Hosted USDA Deputy Under Secretary Anne Bartuska, Congressman Sam Farr, representatives of five local and state agricultural industry organizations for an overview of the Salinas student internship program, "Real World Research Opportunities for Underserved Populations," and an overview of the Salinas Location organic research program. (10/25/2011)
- Hosted four Hartnell College Deans for discussions about enhancing their student intern program. (11/2011)
- Hosted Barbara Allen-Diaz, incoming Vice President, University of California, Division of Agriculture and Natural Resources, and Bill First, Dir., University of California, Cooperative Extension Research Centers. (2/10/2012)
- Trained two seed industry scientists on the identification of bacterial plant pathogens. (2/13-17/2012)
- Hosted the 2012 AgKnowledge class (~ 20 participants), which is sponsored by the Salinas Valley Grower-Shipper Association. (5/11/2012)
- Hosted a strawberry field day (~ 75 attendees) focused on fumigant and non-fumigant alternatives to methyl bromide (5/24/2012).
- Provided information to a seed industry scientist on pathogenicity and seed testing, molecular identification, and management of bacterial plant pathogens. (6/19/2012)
- Demonstrated western irrigation practices for two sessions (~ 90 participants total) of a food safety training course organized by the Western Institute of Food safety, University of California, Davis. (6/19/2012 and 7/17/2012)
- Hosted incoming Hartnell College President Willard Lewallen and associated STEM administrators to provide an overview of work by Hartnell College Student Interns at the Salinas Location. (7/26/2012)
- Hosted a strawberry field day (~ 20 attendees) focused on non-fume alternatives to methyl bromide (8/9/2012).
- Hosted Congressional delegation that included Congressman Jack Kingston, Chairman, Subcommittee on Agriculture Appropriations; Congressman Sam Farr, Ranking Member, Subcommittee on Agricultural Appropriations; Alec Arago, District Director for Congressman Farr; Jim Bogart, President and General Counsel, Grower-Shipper Association of Central California; Matt McInerney, Executive Vice President, Western Growers; and Dennis Donohue, Mayor, City of Salinas. (8/25/2012)
- Hosted five Serbian scientists funded by USDA-FAS for a training workshop on the identification of bacterial plant pathogens organized by the Salinas Location. (9/15-29/2012)

Colorado:

Central Great Plains Research Station (Akron, CO)

- Hosted a Field Day on dryland cropping systems research. Attended by farmers, ranchers, and Natural Resources Conservation Service, Agribusiness and Extension personal (6/15/2011).

Sugar Beet Research Unit (Fort Collins, CO)

- Hosted a tour as part of a Western Sugar Cooperative tour to Fusarium research plots in Sterling, CO. Attended by about 35 growers, agriculturalists, and seed company representatives (7/23/2012).

Agricultural Systems Research Unit (Fort Collins, CO)

- Hosted an open house for customers and stakeholders presenting research on agricultural systems models and demonstrated the use of 'Summer crop Selection', 'Colorado Water Optimizer' and 'Rangelands Drought Calculator' decision tools (September 29, 2011).

National Center for Genetic Resources Preservation (Fort Collins, CO)

- Conducted tours for the Potato Growers Association highlighting seed and clonal preservation processes and storage facilities. Attended by 88 growers (3/06/2012 & 8/15/2012).
- Conducted a tour and workshop for Brazilian Agricultural Research Agency EMBRAPA scientists highlighting preservation and research activities of plant and animal genetic resources. Attended by 30 scientists (12/04-06/2011).
- Conducted a tour for members of the Plant Growth Regulator Society highlighting preservation and research activities of both plant and animal genetic resources. Attended by 15 scientists (07/26/2012).
- Conducted tours for the Citrus Growers Association highlighting research on citrus clonal micropropagation techniques to provide disease-free citrus clones for long term preservation and storage. Attended by over 80 people (10/05/2011 & 8/29/2012).
- Conducted a tour to 14 scientists visiting from China (9/14/2012).

Water Management Research Unit (Fort Collins, CO)

- Conducted tours of the Limited Irrigation Research Farm to 50 people from the Colorado Interbasin Compact Committee (9/10/12), 50 people from the Colorado Water Education Foundation Agricultural Water Workshop (10/17/11), and 25 people from the Breeding for Drought Stress class (6/14/12).
- Co-Organized, hosted, and presented an Evapotranspiration Workshop. Attended by 120 people (3/21/12).

Northern Plains Area Office (Fort Collins, CO)

- Hosted a Northern Colorado Technology Transfer Fair along with the Centers for Disease Control (CDC), Animal Plant Health Inspection Service (APHIS), Forest Service (FS), and the National Renewable Energy Laboratory (NREL) to highlight research from the Federal Labs in Northern Colorado. The event was attended by 180 registrants (08/07/12).

Florida:

U.S. Horticultural Research Laboratory (Fort Pierce, FL)

- Hosted the Annual Open House/ Field Day highlighting research on insect biology and behavior, horticultural plant pathogens, water quality enhancement, sensory evaluation of fruits and vegetables,

postharvest physiology, citrus genetics, utilization of citrus processing by-products, and biological pest management. Attended by over 400 people (4/4-5/2012).
- Hosted the Science Institute of Discovery (6/19, 21, 26, 28/2012).
- Consulted by EPA on the status of research on alternatives to methyl bromide for cut flowers (5/8 & 7/24/ 2012).
- Presented "Updates on Watermelon and Cucurbit Viruses, and *Groundnut ringspot virus* in South Florida" at the University of Florida Extension's vegetable growers meeting (2/2012).

Subtropical Horticulture Research Station (Miami, FL)

- Participated in the Miami Dade College's Children's Holiday event with presentation of interactive chemistry activities. Attended by over 25,000 children and their families (12/10/2011).
- Hosted members of the California Avocado Commission and the Florida Avocado Growers for presentations on research activities and discussions on industry concerns and strategies for management of ambrosia beetles and their associated fungal pathogens (5/30-31/2012).
- Participated in the Redlands Fruit Festival in Homestead, Florida. Attended by over 2,500 local residents (6/16-17/2012).
- Hosted a tour during Miami Community Day highlighting facilities with educational displays and an interactive area for children that included a butterfly house, biological control insects, hands-on chemistry activities and 4H activities, and taste tests. Attended by over 700 area residents (6/23/2012).
- Organized a symposium "Coupling USDA Research Projects with Student's Academic Preparation" for over 60 participants from APHIS, the Everglades National Park, Fairchild Tropical Botanic Garden, Florida International University, Miami-Dade College, and St. Thomas University (3/29/2012). Organized a symposium "Coupling USDA Research Projects with Student's Academic Preparation" for over 60 participants from APHIS, the Everglades National Park, Fairchild Tropical Botanic Garden, Florida International University, Miami-Dade College, and St. Thomas University (3/29/2012).
- Organized field and lab tour for 60 Honduran students and students from local Universities and Colleges (10/19/2012).
- Presented to the Palmetto Bay Garden Club on amaryllis. Attended by 30 people (9/24/2012).
- Presented a history of the Station and ornamental germplasm program to the Gifford Arboretum of University of Miami. Attended by 20 people (11/1/2012).

Center for Medical, Agricultural, and Veterinary Entomology (Gainesville, FL)

- Hosted the 50th Anniversary Celebration for the Center for Medical, Agricultural and Veterinary Entomology (CMAVE) with a formal program on research activities and a tour of the facility. The event was attended by over 40 stakeholders and customers from academia, Florida mosquito control programs, and industry.
- Co-Hosted with Behavior and Biocontrol Research Unit and Mosquito and Fly Research Unit a booth at the Florida State Fair as part of an "Insect Encounters" exhibit at the Fair. Annual attendance at the Fair approaches nearly half a million people with approximately 65,000 passing through the "Insect Encounters" exhibit area (2/8/12 – 2/20/12).

Behavior and Biocontrol Research Unit (Gainesville, FL)

- Co-sponsored the "Grape Harvest Festival" with the Center for Viticulture and Small Fruits at Florida A&M University highlighting current research activities. Attended by over 2,000 people (08/25/2012).

- Presented Workshop highlighting research on conservation biological control on Thrips and Tospovirus management in pepper, eggplant, and tomato as part of the University of Florida In Service Training (3/ 2012).
- Presented research on biological control of vegetables at the Beginning Farmer and Rancher Workshop, coordinated by the Florida A&M University / University of Florida Cooperative Extension Service (10/14/12).

- Co-hosted tours and made presentations at the IPM Field Day with Florida A&M Univ. / University of Florida Cooperative Extension Service and Florida A&M University's Center for Viticulture and Small Fruits. Attended by the general public (10/12/2011, 6/1/4/2012, 6/14/2012).
- Presented research on the invasive cactus moth at a volunteer training symposium at the Guana Tolomato Matanzas National Estuarine Research Reserve, Ponte Vedra, FL. Attended by natural resource managers, college and high school students, local landowners (07/02/ 2012).
- Participated in Entomology Field Day and Workshop with Florida A&M University. Attended by over 100 people (11/1-3/2011).
- Presented research on integrated pest management and biocontrol of major insect pests to organic and sustainable growers organized by the Red Hills Small Farm Alliance, Tallahassee, FL. Attended by general public. (02/12/2012).
- Present research on biocontrol of pests in vegetable and horticultural systems to organic and sustainable growers organized by the Florida A&M Univ. small farm program, Sopchoppy, FL (12/16/2012)

Imported Fire Ant and Household Insects Research Unit (Gainesville, FL)

- Hosted Professor, Taiwan National University and Director of the Taiwan Fire Ant Control Center for 3 months, during which time he became familiar with fire ant biological control techniques developed by Unit Scientists. This will facilitate the adoption of these practices in the fire ant infested areas of Taiwan (June – August 2012).
- Interacted/Consulted with US Parks Service and Nature Conservancy personnel responsible for Santa Cruz Island, CA and the eradication of isolated populations of invasive Argentine ants.
- Hosted, facilitated, participated, and acted as consultants to a film crew that developed a "Discover" style 3-D video entitled "Fire Ants: The Invincible Army." The video is being marketed and viewed worldwide.
- Conducted a lab tour highlighting biological control of fire ants with insect pathogens to the Univ. Florida biological control class (2/2012).
- Gave a tour of invasive and other pest ants for the International Association of Operative Millers Food Protection (2/2012).
- Arranged tours of fly, mosquito, ant rearing and quarantine facilities to demonstrate aspects of insectary design for the MRI Architectural Group, Inc. (8/2012).
- Gave a presentation for Georgia Pest Control Association Summer Conference in Palm Coast, FL on fire ant biology and management to 30 attendees (7/2012).

Mosquito and Fly Research Unit (Gainesville, FL)

- Participated in the 3rd Annual Educator Open House at the Florida Museum of Natural History for teachers from Alachua County Schools (10/1/2011).
- Presented an orientation about *Aedes aegypti* biology and control to 27 science teachers in the High School Science Teachers Institute at the University of Florida (6/15/2012).
- Hosted tours to for the Navy Entomology Center of Excellence (11/8/2011), University of Florida students and teachers, international students from the University of Miami (7/26/2012), and members of the Georgia Pest Control Association (7/19/2012) on of facilities.

Chemistry Research Unit (Gainesville, FL)

- Writes a monthly column, "Science Buzz", for the news letter "E-BUZZ" by the American Bee Federation on scientific issues pertaining to beekeeping.

Sugarcane Field Station (Canal Point, FL)

- Co-hosted with the University of Florida field tour of yield trials and presented yield results to sugarcane growers (5/31/2012, 6/1/2012).
- Hosted 18 graduate students and post-doctorial research associates from the Agronomy Department of the University of Florida for a program on sugarcane crossing and the ARS Cultivar Development Program (12/20/2011).

- Hosted Workshop for 15 Central American and Brazilian agriculturalists/scientists on yields and disease reactions of ARS sugarcane cultivars. These cultivars occupy from 15 to 95 % of the commercial sugarcane production in their 7 countries (1/9/2012).
- Hosted 30 sugarcane agriculturalists from Australia and Brazil and gave presentation on the ARS Cultivar Development Program (2/2/2012).
- Gave presentation on ARS Sugarcane Development Program to 14 members of Florida Farm Bureau delegation (6/13/2012).

Georgia:

Southeastern Fruit and Tree Nut Research Laboratory (Byron, GA)

- Hosted the Triennial Open House/ Pecan Field Day highlighting research on entomology, pathology and horticulture of pecan. Attended by over 425 people (5/2012).
- Hosted Annual Central Georgia Peach and Pecan Updates highlighting research on breeding, nematology, entomology, pathology and horticulture of peach and pecan (2/ 2012)
- Several scientist spoke at 6-10 different state and regional peach and pecan conferences to update farmers on certain specifics of peach and pecan culture.

National Peanut Research Laboratory (Dawson, GA)

- Worked with the engineers from AIC Partners group and scientists from the Department of Industries and Fisheries and the University of Queensland, Australia to developing sensors suitable for both moisture and oil determination in peanuts to be used with the instrument ARS designed (1/10/2012, 3/15/2012, 4/21/2012, 5/11-5/25/2012).
- Hosted tours to researchers from Albany State University (9/19/2012), Annual Georgia Peanut Tour, Georgia Association of Conservation District Supervisors Group IV Summer Meeting (6/19/2012), and drip irrigation distributors (4/2012).
- Participated in workshops to members of the Georgia Young Farmers Association, Georgia Cooperative Extension Service, and growers by presenting, demonstrating, and distributing copies of the ARS FARMSUITE software crop for peanut production management.
- Hosted booths presenting research results at the Georgia Peanut Farm Show (1/19/2012), Alabama/Florida Peanut Farm Show (2/9/2012), and PB&J Day at the Georgia State Capitol (3/6/2012).
- Participated in the Georgia Peanut Commission research meeting providing research results on variety and digging dates (2/8/2012).
- Provided research results on aflatoxin in peanut to NIFA-AFRI Stakeholders meeting in Washington, DC (2/22/2012).
- Participated in meetings hosted by the GA Water Planning and Golden Triangle RC&D (3/3/2012) and the Southwest Georgia Project for Community Education, Inc. (5/10/2012) by demonstrating FarmSuite software for peanut production management and irrigation technology for socially disadvantaged and historically underserved growers.
- Participated in irrigation workshops hosted by Central GA and Ocmulgee Soil and Water Conservation District 29 (3/29/2012) and the Lower Chattahoochee River Soil and Water Conservation District (7/17/2012) presenting research data and demonstrating the ARS Irrigator Pro technology.
- Participated in a workshop with Auburn University on peanut breeding and biotechnology research for CEO's of the peanut industry and leaders of peanut farmer groups (8/20/2012).

Southeast Watershed Research Laboratory (Tifton, Georgia)

- Hosted two visiting scientists from Uraguay and provided tour of research activities associated with biofuels (10/06/2012).
- Conducted tours and made presentations to Soil Science (9/25/2012) and Hydrology (10/30/2012) classes from Abraham Baldwin Agricultural College.

Plant Genetic Resources Conservation Unit (Griffin, GA)

- Presented research progress at Kiwanis Farm-City Week, Griffin, GA. Attended by 110 people (11/23/2011).
- Conducted tours and made presentations to 10 visitors from China (1/26/2012), Brazil (4/11/2012), and South Africa (9/17/2012).
- Conducted tours and made presentations to Spalding Chamber of Commerce (4/12/2012), University of Georgia External Affairs (7/27/2012) and Dean's Council (8/16/2012), S-009 Multistate committee (8/1/2012), and Tuskegee University (8/28/2012). Attended by 78 people.
- Conducted tours for students from Orrs (10/24/2011), Taylor (3/1/2012), Pike (3/21/2012), Rehoboth Road (5/9/2012), and Life Community (6/22/2012) schools. Attended by 297 students.
- Presented research progress at Peachtree City Library, GA, seed program. Attended by 50 people (8/4/2012)
- Presented research progress at the Experiment Station Directors meeting in Portsmouth, NH. Attended by 35 stakeholders (9/24/2012).

Southeast Poultry Research Laboratory

- Hosted a stakeholders meeting for 22 invited participants representing government agencies, the poultry industry, and university faculty that presented a review of the research programs at the laboratory and invited opportunities for stakeholders to provide input on research priorities at the laboratory (5/16/2012).

Hawaii:

Tropical Plant Genetic Resources and Disease Research Unit

- Hosted a booth about career opportunities at PBARC at the Career Opportunities Expo by Na Leo O Na `Opio and the Department of Education, attended by 427 high school students. (1/26/12)
- Conducted a facilities tour for Hawaii Community College Agriculture Business students. (9/12/12)
- Conducted a facilities tour for University of Hawaii at Hilo, College of Agriculture, Forestry, and Natural Resource Management for freshmen students. (11/15/11)
- Conducted greenhouse tours and discussed research programs with the public and dignitaries at the PBARC Phase II Dedication. (2/24/12)

Tropical Crop and Commodity Protection Research Unit

- Hosted visiting scientist from Brazil to learn about our fruit fly parasitoid rearing operation and establish collaboration to provide the EMBRAPA (research arm of the Brazilian Dept. of Agriculture) with Fopius arisanus, a fruit fly parasitoid (8/13-8/18/12)
- Hosted an extension field day in Puna, HI, a cooperative effort with UH PEPS, Extension Service and ARS to demonstrate new technology on SPLAT-ME-spinosad technology to control tephritid fruit flies in papaya orchards. Demo was given to Papaya farmers (8/8/12).

Idaho:

Northwest Watershed Research Center/Reynolds Creek Experimental Watershed, Boise

- Presented training and information at the Ecologically-Based Invasive Plant Management (EBIPM) Field School and Learning Fair in Reno, NV (50 participants, 8/28-29/12) and EBIPM workshop for 60 US Forest Service Employees in Redmond, OR (5/15/12).
- Presented NWRC rangeland restoration research for 30 BLM employees (Including BLM Director Robert Abbey) at the Snake River Birds of Prey National Conservation Area (5/6/12)

- Co-hosted rangeland seeding equipment demonstration for BLM, NRCS, USFS and USGS employees in the Snake River Birds of Prey National Conservation Area (7/18/12).
- Participated in BLM Desert Discovery Days and presented invasive weed issues for 475 Kuna, Boise and Meridian school district students at the Snake River Birds of Prey National Conservation Area (5/3-4/12).
- Hosted Owyhee Hydrology Camp at the Reynolds Creek Experimental Watershed (RCEW) in the Owyhee Mountains. (4/11-12/12).

Northwest Irrigation and Soils Research Laboratory, Kimberly

- Hosted tour to present research associated with the influence of diseases on storage management in sugarbeet to growers, industry personnel, and scientists (2/13/12).
- Participated in Twilight Tour at the University of Idaho Res. & Ext. Center, Kimberly, ID. Presented poster displays and diseased plant material associated with research to the general public (7/18/12).
- Hosted field tour to present field research on curly top, rhizomania, and Rhizoctonia-bacterial root rot disease management in sugarbeet to growers, industry personnel, and scientists (7/25/12).

Illinois:

Soybean/Maize Germplasm, Pathology & Genetics and Global Change and Photosynthesis Research Units

- Participated in presentations at the University of Illinois' Agronomy Day regarding research on edamame and research activities at SoyFACE. Approximately 1000 attendees, including farmers, farm managers, junior college students, and ag industry personnel (8/16/2012).

National Center for Agricultural Utilization Research

- Hosted the North American Miller's Assocation/Corn Dry Miller's annual conference and provided updates on related ARS research (5/2012).

Iowa:

North Central Regional Plant Introduction Station

- Hosted Ames IA field day for the Germplasm Enhancement of Maize (GEM) Project. Over 60 people attended the field day, including private sector and university research (09/19/2012).
- Serves the world's plant genetic resource needs. As part of the U.S. National Plant Germplasm System, PIRU staff shipped nearly 40,000 packets of seed or plants to germplasm researchers in the past year.

National Laboratory for Agriculture and the Environment

- Co-organized and held 5 cover crop management workshops/field days at Research and Demonstration Farms across the state. Participation by NRCS field staff, as well as public. Presentations by researchers, farmers, and agricultural industry professionals (03/28/2012).

National Animal Disease Center

- Hosted 2 Midwest Dairy Association Board Meetings and presented updates on selected aspects of dairy cattle health research. In addition, an update was provided on the 2012 California BSE case diagnosed in the U.S. and an overview of ongoing BSE research programs. Over 75 dairy producers, extension agents, and university faculty total attended the meetings (6/19/2012 and 9/26/2012).

Kansas:

Center for Grain and Animal Health Research (Manhattan, KS)

- Co-hosted with Animal and Plant Health Inspection Service, the Farm Service Agency, the National Agricultural Statistical Service, the Natural Resources Conservation Service, the Risk Management Agency, and Rural Development a USDA 150th Anniversary Celebration at the new Wind Erosion Research Laboratory. In addition to the formal program, the event also included a resource fair. Attended by over 300 stakeholders, customers, the general public, and members of the press (4/10/2012).
- Hosted the Plains Grains Inc. Board of Directors and State Administrators. Attended by 20 wheat commissions and other administrators representing the 12 state Great Plains hard winter wheat growing region (4/11/2012).
- Discussed research needs and opportunities with members of the Sorghum Checkoff program (April 12, 2012).

Louisiana:

Cotton Structure & Quality Research Unit (New Orleans, LA)

- Conducted tours for 54 attendees of the 2012 Southern Cotton Ginners Association Summer Meeting (7/8/2012).

Honey Bee Breeding Genetics & Physiology Laboratory (Baton Rouge, LA)

- Hosted annual Field Day with a record high attendance of 298 beekeepers (10/15/2011).

Sugarcane Research Unit (Houma, LA)

- Co-hosted with the Louisiana State University the Terrebonne Parish Sugarcane Field Day (6/1/2012).

Cotton Fiber Bioscience Research Unit, Cotton Chemistry and Utilization Research Unit, Cotton Structure and Quality Research Unit, and Food Processing and Sensory Quality Unit (New Orleans, LA)

- Conducted tours for Cotton Incorporated's bi-annual Cotton Breeders Tour. Attended by over 135 individuals from private companies, public institutions, and eight foreign countries (8/30-9/1/2012).

Maine:

Genetic Improvement for Fruits & Vegetables Laboratory (Beltsville, MD)

- Conducted the annual Potato Breeding Program's Cooperators' Harvest in Presque Isle, ME for over 900 different advanced selections with input provided by university scientists and extension personnel from Florida, North Carolina, Maryland, Pennsylvania, New York, Long Island, Maine and two growers (9/9-12/ 2012).

Maryland:

Beltsville Area Office

- Coordinated and Co-sponsored with the University of Maryland a Symposium on *Trends in Agriculture* talks on symbiogenetic phenomenon, development of perennial grains, linking food production to ecological realities, and sequencing and assembling large genomes with new technology. Included a poster session highlighting research conducted by the University of Maryland and BA scientists. Approximately 140 people attended the event. (10/2011)

Sustainable Agricultural Systems Laboratory (Beltsville, MD)

- Organized a 3-day workshop n Stevensville, MD for 10 national leaders in organic grain research and outreach to develop a Grains Systems Community of Practice (CoP) for eOrganic, which is a part of eXtension (2/2012).
- Co-hosted the Maryland Organic Grain, Forage and Vegetable Workshop with University of Maryland Extension and Maryland Department of Agriculture in Queenstown, MD (3/6/2012).
- Conducted a tour on research integrating cover crops and animal wastes to improve agricultural sustainability; nutrient dynamics and greenhouse gas emissions in reduced-tillage organic systems; and long-term farming systems research to USDA Know Your Farmer, Know Your Food Committee (8/7/2012).
- Conducted a Sustainable Farming Research Tour for over 130 farmers, agricultural professionals and agency personnel highlighting projects on integrating cover crops and animal wastes to improve agricultural production(8/28/2012).
- Conducted a tour for the policy group AGree on long-term farming systems research; integrating cover crops and animal wastes in reduced-tillage organic systems; and perennial wheat breeding lines (9/19/2012).

Food Composition & Methods Development Laboratory (Beltsville, MD)

- Coordinated a 2-day research symposium and mentors for 26 students from the 1890 Land Grant Universities (2/10-11/2012).

Bee Research Laboratory (Beltsville, MD)

- Participated in the Smithsonian Folklife Festival on the Mall in Washington, DC featured the Bee Laboratory (7/2012).

Genetic Improvement for Fruits & Vegetables Laboratory (Beltsville, MD)

- Participated in the Annual Blueberry Growers' Open House providing research results on the mycorrhizae colonization of blueberry (3/13/12).
- Participated in the American Cranberry Grower's Association providing research results on the colonization of cranberry with ericoid mycorrhizae (8/16/12).

Hydrology and Remote Sensing Laboratory

- Conducted a tour of the OPE3 field site for "Know Your Food" committee, industry, students and interns providing recent major research accomplishments with regard to agrichemical transport and fate, precision agriculture and remote sensing (8/7/ 2012).

Invasive Insect Biocontrol & Behavior Laboratory

- Participated University of Maryland Day presented stink bug, bed bug and tick bug exhibits to 100's of people (3/26/2012).
- Participated in Brown Marmorated Stink Bug Working Group meetings at Virginia Tech in Winchester, VA presenting research accomplishments to industry chemist, formulators, farmers/growers and University researchers (6/12-13/2-012).

National Germplasm Resources Laboratory

- Conducted a two-week workshop on GRIN-Global sponsored by PROCINORTE-NORGEN, a North American agricultural research collaborative project, at the Mexican National Genetic Resources Center in Jalisco, Mexico . Attended by 29 trainees from five different countries (1030-11/10/2012).

- Organized and hosted an approximately 2 hour virtual meeting/webinar for 32+National Plant Germplasm System Crop Germplasm Committee Chairs providing updates from the Office of National Programs, the Plant Exchange Office, and GRIN-Global (10/26/2012).
- Met with numerous research/policy groups to explain activities related to agricultural plant germplasm and answer questions. The most notable were: White House Office of Science and Technology Policy delegation (11/11/2011) and an Agricultural Delegation from Gansu Province in China (11/23/2011).

Nematology Laboratory

- Hosted a visit of the Research Director for potato commissions of Idaho, Washington and Oregon, together with a grower from Idaho, and a grower and member of the Washington Potato Commission to explain the science behind the identification in Oregon of a new type of cyst nematode discovered in Oregon which can reproduce on potato (3/1/2012).

Sustainable Perennial Crops Laboratory

- Hosted the World Cocoa Foundation meeting addressed current research and new research-needs of the industry. Attended by 40 cacao researchers from USA, Ghana, Costa Rica, Indonesia, and UK and members from the chocolate industry (Kraft, ADM, Mars, Hershey), as well as several NGOs and the WCF (6/15/2012).

Systematic Entomology Laboratory

- Participated in a multi-day exhibit at the 2012 USA Science and Engineering Festival in Washington, DC, presenting research accomplishments to over 150,000 participants.
- Participated in USDA's Ag Discovery program at the National Museum of Natural History in Washington, DC (7/26/ 2012).

Floral & Nursery Plants Research Unit

- Hosted a booth at Mid-Atlantic Nursery Trade Show presenting research accomplishments. Attended by about 10,000 people (1/11-13/2012).

Michigan:

Sugarbeet and Bean Research Unit

- Co-organized a sugar beet diagnostic day at the Saginaw Valley Research and Education Center. Participated as instructor and in setting up demonstration plots. Attended by over 100 local growers, field consultants, and private industry participants.
- Participated in a USAID-funded project on breeding dry bean varieties that are suitable for African countries, and conducted a Participatory Plant Breeding Workshop for technical staff in Rwanda (2/2012).

Minnesota:

Plant Science Research Unit

- Co-hosted a workshop on fast neutron mutagenesis of soybean for 40 soybean researchers to a workshop on fast neutron mutagenesis of soybean. Workshop included classroom presentations, as well as demonstration field plots (07/17/2012).

North Central Soil Conservation Research Lab

- Conducted annual field day in conjunction with 150th anniversary of USDA, including the evolution of maize, organic weed strategies and land resource sustainability.
  Participation included more than 80 farmers, producers, crop consultants and scientists (08/16/2012).

Soil and Water Management Research Unit

- Presentation of Ag-Water Research concepts to MN Departments of Health & Agriculture, MN Pollution Control Agency and MN Department of Natural Resources (1/25/12). Presentation taped and sent to district offices around MN.

Mississippi:

Cotton Ginning Research Unit (Stoneville, MS)

- Along with the Cotton Technology Transfer Coordinator, hosted the Western Ginner School. Attended by 78 gin managers and operators (6/12-14/2012).

Southern Insect Management Research Unit (Stoneville, MS)

- Hosted the Mississippi Agricultural Consultants Association to discuss current and future research needs (3/19/2012).
- Hosted representatives of Cotton Incorporated, National Corn Growers, National Cotton Council, and United Soybean Board to discuss current research and future research needs (4/19/2012).

Thad Cochran Southern Horticultural Laboratory (Poplarville, MS)

- Hosted the annual meeting of the Southern Extension and Research Activity – a collaborative group of university and ARS researchers that conduct woody ornamental plant evaluations (6/6/2012).
- Hosted visitors and tours as part of the 29th Annual Blueberry Jubilee (6/9/2012).

Water Quality & Ecology and Watershed and Physical Processes Research Units (Oxford, MS)

- Hosted a Field Day for Oxford Elementary 3rd grade classes with 350 students, teachers, and chaperones attending. Participation was in conjunction with the National Sedimentation Laboratory's Adopt-A-School Program (3/30/2012).

Genetics and Precision Agriculture Research Unit, Crop genetics Research Unit, Genomics and Bioinformatics Research Unit, Southern Insect Management Research Unit, Catfish Genetics Research Unit, and Cotton Ginning Research Unit (Oxford, MS)

- Hosted stops on Cotton Incorporated's bi-annual Cotton Breeders Tour. Attended by over 135 individuals from private companies, public institutions, and eight foreign countries (8/30-9/1/2012).

Missouri:

Plant Genetics Research Unit

- Hosted Stakeholders meeting in Columbia, MO. Presented an overview of the mission and programs, along with ARS research programs and recent accomplishments to the major stakeholders for the programs, including National and State Corn Growers Associations, National and State Soybean Associations, universities, private industry and the Donald Danforth Plant Science Center (3/21/2012).

Cropping Systems and Water Quality Research Unit

- Presented "Bionergy Production on Poorly-Drained Soils of the Midwest", Sustainable Bioenergy Training Program for Extension Educators of the North Central Region, in Columbia, MO, with approximately 45 participants (4/1/2012).

Montana:

Northern Plains Agricultural Research Laboratory (Sidney, MT)

- Hosted a Field Day at the Dryland Research Farm in Froid, MT to discuss cropping systems and pest management research. Attended by farmers, ranchers, Natural Resources Conservation Service, Montana Department of Agriculture, Agribusiness and University Extension personal (6/28/2012).
- Hosted a field day at the Dryland Research Farm in Sidney, MT to discuss cropping systems, pest management, greenhouse gas emission research. Attended by farmers, ranchers, Natural Resources Conservation Service, Montana Department of Agriculture, NRCS Plant Materials Center, Agribusiness and University Extension personal (6/29/2012).
- Co-hosted with Montana State University and North Dakota State University Field Days highlighting irrigation research on shared land in Sidney, MT (7/19/2012) and Nesson Valley, ND (7/25/2012). Attended by farmers, ranchers, researchers, Agribusiness and University Extension personal.
- Participated in the Montana Innovation Catalyst meeting in Bozeman, MT. The meeting was sponsored by TechLink to discussed how industry could find out about ARS technologies and how they can partner with ARS to create technology (8/28/12).

Livestock and Range Research Laboratory (Miles City, MT)

- Made fifteen stakeholder presentations to over 1400 stakeholders at various events around the nation in the past year.
- Co-hosted Fort Keogh on the Road (a traveling Field Day) with the Montana Stockgrowers and Fort Keogh Livestock & Range Research Laboratory with presentations at Choteau, MT (5/23/2012) and Big Timber, MT (1/24/2012). Attended by over 90 producers.

Fort Keogh Livestock & Range Research Laboratory (Miles City, MT)

- Co-hosted Fort Keogh on the Road (a traveling Field Day) with the Montana Stockgrowers and ARS Fort Keogh Livestock & Range Research Laboratory with presentations at Choteau, MT (5/23/2012) and Big Timber, MT (1/24/2012). Attended by over 90 producers.
- Updated Montana Stockgrowers Association stakeholders on new projects they had previous provided planning input and offered feedback on pending research that will be starting later this year. The meeting concluded with a summary research accomplishments from the last year.

Nebraska:

Agroecosystems Management Research Unit (Lincoln, NE)

- Co-hosted with the University of Nebraska a Field Day at the University's Agricultural Research and Development Center on the impact crop residue removal on soil carbon and emission of greenhouse gases. Attended by farmers and researchers (8/8/2012).
- Co-hosted with the University of Nebraska a Field Day at the University's South Central Agriculture Laboratory on amelioration practices to offset negative impacts associated with crop residue removal for use as livestock feed. Attended by farmers, agribusiness, and extension (8/22/2012).
- Participated in a Field Day celebrating the 75th anniversary of the University of Nebraska's Agricultural Research and Development Center and the 150th anniversary of the passage of the Morrill Act. Presented information regarding collaborative research between USDA-ARS and the University on cropping systems

and residue removal impacts on soil organic matter and greenhouse gas emissions. Attended by the general public (9/23/2012).

Grain, Forage, and Bioenergy Research Unit (Lincoln, NE)

- Co-hosted with the University of Nebraska a Field Days at the University's Agricultural Research and Development Center on switchgrass establishment, weed control,
herbicides, seed quality, economics, and drill calibration. The information was broadcast as a webinar to numerous participants (3/20/2012, 8/2/2012, & 8/7/2012).
- Participated in the University of Nebraska Range Short Course at Chadron, NE by providing training on bioenergy, range plant physiology, and integrating forages with rangeland. Attended by 20 graduate students and federal and state resource professionals and (6/18 & 20/2012).
- Conducted Crop Management and Diagnostic Clinic. Attended by 45 farmers, certified crop consultants, professional agronomists, and farm management consultants (8/30/ 2012).
- Participated in University of Nebraska's "Sunday with a Scientist" on biomass fuels and soils. Attended by 92 adults, 86 children and 27 University students (9/16/2012).
- Participated in a Field Day celebrating the 75th anniversary of the University of Nebraska's Agricultural Research and Development Center and the 150th anniversary of the passage of the Morrill Act. Presented information regarding collaborative research with the University on biomass energy crops including switchgrass and other perennial grasses for use in pastures. Attended by the general public (9/25/2012).

U.S. Meat Animal Research Center (Clay Center, NE)

- Hosted an education program on DNA technology transfer attended by beef producers.
- Hosted an educational program on DNA tests for Ovine Progressive Pneumonia for sheep producers.
- Hosted a focus group for sheep. Discussed research being done on selection for easy care lines of sheep and OPP. Discussed issues, trends and research needs of the sheep industry.

Nevada:

Great Basin Rangelands Research Unit, Reno

- Led a field tour for Univ. Nevada, Reno students from a Range and Forest Soils Class. (4/20/12)
- Provided a field tour and workshop to 23 attendees at the Barrick Gold "Dean Ranch" to showcase USDA-ARS Great Basin Rangelands Research Units field site. . (5/22/12)
- Provided a one day field tour of USDA-ARS Great Basin Rangelands Research Units field site in Kings River, Nevada on plant material testing and cheatgrass suppression. (5/29/12)
- Hosted the annual field tour for the Nevada Section of the Society for Range Management to48 attendees. (6/25/12)
- Participated in the University of Nevada, Reno annual Agricultural Field Days with. over 400 attendees (9/8/12)

New Mexico:

Rangeland Research Unit based at the Jornada Experimental Range (Las Cruces, NM)

- Hosted open house to celebrate 100th anniversary. Over 225 people attended this daylong event (7/14/2012).

Southwestern Cotton Ginning Research Laboratory (Mesilla Park, NM)

- Participated in the Fiber Arts Festival, sponsored by the New Mexico Extension Service in Silver City, NM. Over 100 area residents witnessed ginning demonstrations and discussions of the ARS cotton ginning research program (11/11-12/2011).

- Along with the Cotton Technology Transfer Coordinator, hosted the Western Ginner School. Attendees included gin managers and operators (21) with speakers from ARS gin labs and the cotton industry (5/8-10/2012).
- Participated in the Leyendecker Plant Science Center Centennial Field Day sponsored by New Mexico State University and showcased the agriculture industry and agriculture products of New Mexico as part of the State of New Mexico's statehood centennial celebration and the sesquicentennial of the Morrill Act (8/25/2012).
- Participated in Hispanic, Engineering, Science, and Technology program at University of Texas in Edinburg, TX. The purpose of the event was to share best practices and successful technology with educators and middle and high school students to encourage science as a field of study (9/24-25/2012).

New York:

Grape Genetic Research (Geneva, NY)

- Provided numerous tours of vineyards and orchards to graduate students, students from Vasser College, Finger Lakes Community College Viticulture college classes, visiting foreign scientists etc.
- Provided tours, demonstrations etc of orchards and vineyards, during Cornell Plant Breeding Class and the NE-9: Conservation and Utilization of Plant Genetic Resources meetings.
- Four separate programs were offered at the Ovid Public Library in Ovid, NY with DNA and chromatography demonstrations to after school library club with an emphasis on women in science.
- Participated with several other USDA agencies to take part in an exhibit for the USDA at Empire Farm Days. This is the largest outdoor agricultural show in the northeast that has 600 exhibitors and draws about 70,000 people over the three days (8/2012).
- Hosted an Open House with tours and demonstrations at the McCarthy farms of orchards, and vineyards (9/22/2012).

Plant, Soil and Nutrition Research Unit (Ithaca, NY)

- Developed a traveling exhibition on the evolution of maize (Maize: Mysteries of an Ancient Grain). Visitors can explore the science of how maize has evolved over thousands of years to become one of our most significant crops, and discover why it continues to surprise us today. In addition to the exhibit created a Teacher-Friendly Guide to the Evolution of Maize that is available for free online (http://maize.teacherfriendlyguide.orgl). The guide is designed to provide teachers with background information necessary to teach the concept of evolution. Thus, educators around New York State have been provided resources to help connect a field trip the exhibit to their broader science curricula.

Biological Integrated Pest Management Research & Plant-Microbe Interactions Research Units (Ithaca, NY)

- Co-hosted a booth with ARS Unit at Geneva, NY, at the Empire Farm Days presenting displays & information on research programs for farming community and general public (8/7-9/2012).
- Held multiple meetings with land owners, county and state park and tribal land officials, NY State Ag & Market officials, to discuss work on Emerald Ash Borer and Ambrosia beetle biological control.

North Carolina:

Soybean & Nitrogen Fixation Unit (Raleigh, NC)

- Organized a workshop on Drought Tolerance Breeding Workshop for 19 University and ARS scientists to share techniques and approaches for developing more climate resilient crops (3/2012).
- Hosted a Field Day and tour for educators from the North Carolina Museum of Natural History of research programs in preparation for a larger tour of high school science educators in July 2013 (7/2012).

Food Science Research Unit (Raleigh, NC)

- Hosted a Pickle Research/Brainstorming Meeting with participants from 7 pickle companies and Pickle Packers International, Inc. (1/17-18/ 2012).
- Presented research findings to the Manufacturing and Technology Committee of Pickle Packers International, Inc. on starter cultures for vegetable fermentations, microbiology and biochemistry of spoilage in cucumber fermentation, and the safe processing of acidified foods.
- Participated in the Sweetpotato Field Day at Faison, NC presenting a processing research (10/13/ 2011) and at the Sweetpotato Regional Meeting in Smithfield, NC presenting research on factors affecting product quality (2/16/2012).
- Co-hosted with NC State University the Acidified Foods GMP School to provide training for 35 participants from industry and regulatory agencies to comply with the U.S. acidified foods regulation (4/30-5/2/2012).

North Dakota:

Northern Great Plains Research Laboratory (Mandan, ND)

- Celebrated its 100 year anniversary at its annual Friends and Neighbors Day. More than 600 farmers, ranchers, community leaders, agency personnel, and local citizens attended the event (7/19/2012).

Red River Valley Agricultural Research Center Research (Fargo, ND)

- Hosted the annual meeting of the Red River Valley Agricultural Research Center Research Partners. Presented research briefs and participated in a commodity specific round table discussion of research needs and funding priorities (12/9/2011).

Grand Forks Human Nutrition Research Center (Grand Forks, ND)

- Co-hosted with the Altru Health System and the Grand Forks Park District the dedication and open-house of a new, 160,000 sq. ft. community health and fitness center, which will also house a worksite of the community nutrition and physical activity program of the Center. Attended by about 3500 people from the Grand Forks Community (9/24/2012).

Ohio:

Application Technology Research Unit

- Presentations at Ohio Florists Association Meeting in Columbus, OH, including using CO2 in greenhouses and environmental control of flowering, as well as demonstrations of Virtual Grower, a greenhouse decision-making tool available on the ARS website. (7/2012).
- Demonstrated new sprayer performance for nursery and vineyard growers, sprayer manufacturer engineers, chemical company representatives, extension educators and researchers from OH, NY, PA, KY, TN, NC, IN, MI and WI (Summer 2012).

Soil Drainage Research Unit

- Helped to develop, organize and presented a webinar sponsored by USDA/NRCS, “Use of Geophysical Methods in Agriculture,” with 113 participants (8/21/2012).

Oklahoma:

Grazinglands Research Laboratory (El Reno, OK)

- Hosted an Oklahoma Land Stewardship Association Grazing Academy to illustrate how grazing intensity and duration affect plant communities of native prairie pastures. Attended by 20 producers from Kansas, New Mexico, Texas, Oklahoma, and Colorado (11/15-17/ 2011).
- Co-organized with the Oklahoma Chapter of Soil and Water Conservation Society a workshop on Communicating with New Producers to exchange information on changing demographics of Oklahoma producers and use of social media to reach non-traditional agricultural producers. Attended by 75 people from a wide range of state, federal, and private sector organizations.
- Hosted a group of Oklahoma Extension Agents for in-service training. Attended by about 18 extension agents (8/8/2012).

Oregon:

Columbia Plateau Conservation Research Center, Pendleton

- Co-hosted with Oregon State University (Columbia Basin Agricultural Research Center) a Field Day to convey research results to stakeholders (6/12/2012).
- Hosted Tiichim Board of Directors from Confederated Tribes of the Umatilla Indian Reservation to inform the group of ARS' research and capacities at this location.

National Clonal Germplasm Repository, Corvallis

- Hosted a blueberry open house with approximately 60 visitors. Members of the public received samples of blueberries and literature related to blueberries, including those grown at ARS (7/26/12).

Range and Meadow Research Unit, Burns

- Hosted the annual Range Field Day at the northern Great Basin Experimental Range.. Attendees included scientists, employees of state and federal land management agencies, and ranchers. Unit scientists presented information on rangeland management and restoration. (6/26/2012)
- Sponsored and participated in symposium on Ecologically Based Invasive Plant Management at annual Society for Range Management meetings in Spokane WA. Attendees included scientists, land managers, and policy specialists. (2/2/2012)

Pennsylvania:

Pasture Systems & Watershed Management Research Unit (University Park, PA)

- Conducted a Field Day in Crisfield, MD on using flue gas desulfurization gypsum to minimize dissolved phosphorus loss from soils. Attended by 30 people (5/23/2012).
- Hosted a meeting with the National Agricultural Research Institute in Montevideo Uruguay on the 'Energy and Climate Partnership of the Americas' program of USDA-Foreign Agricultural Service. Discussed research results on the life-cycle energy balance for grain sorghum, sweet sorghum, sweet potatoes and woody waste for agroenergy production (5/2012).

Grazing Basics and Animal Behavior Discussed at First Grazing Roundtable (University Park, PA)

- Participated with livestock grazers and aspiring grazers from the Lehigh Valley in the first grazers roundtable.

South Carolina:

U. S. Vegetable Laboratory (Charleston, SC)

- Co-hosted with the Clemson Coastal Research and Education Center the Winter Open House and Tour highlighting research on watermelon, sweet potatoes, broccoli, peppers, leafy greens, and other vegetables. Attended by about 50 people representing a wide range of customer and stakeholder interests (2/28/2012).

Coastal Plains Soil, Water, and Plant Research Center (Florence, SC)

- Participated in the Southern Southeastern, Inc. annual meeting (cotton growers and ginners) held in Hilton Head, SC, by presenting information on irrigation management to approximately 200 attendees (1/25/2012).
- Presented cotton genetics research to the United Soybean Board Drought Tolerance Working Group Annual Meeting held in Charleston, SC. Approximately 30 scientists participated and learned about cotton drought genetics research (3/10/2012).
- Presented research overview to several civic organizations (7/5/2012 & 7/19/2012).
- Hosted visiting foreign scientist from the Brazilian Agricultural Research Agency EMBRAPA to develop more economical manure treatment systems (8/1/12-1/15/13) and the Brazilian Instituto Mato-Grossense Do Algodao on cotton research (5/28/2012-6/1/2012).
- Participated in Clemson University's Pee Dee Farm Field Day at Florence, SC, by presenting research results on cotton breeding and production to approximately 100 farmers, industry representatives, and extension personnel (8/21/2012).
- Participated in and presented research on variable-rate irrigation at the North Carolina Irrigation Society's annual meeting in Raleigh, NC. Attended by over 50 people (11/7/2012).
- Held its annual Customer and Stakeholder Workshop focusing on technological advances in nutrient recovery and reuse, water resources, emerging cropping systems, and how these could function in farming systems. Attended by more than 60 people from state government, academia, federal agencies, and agribusiness (11/8/2012).
- Participated in the Mid-Atlantic Crop Management School to discuss the effective use of biochar to improve soil quality. Attended by over 275 individuals representing university staff, extension agents, farmers, students, and the general public (11/13/ 2012).
- Hosting a Webinar for U.S. EPA staff on livestock waste management focused on nitrogen and phosphorus treatment technologies developed by ARS. The webinar is for EPA staff, both in Headquarters and regional offices (60 to 70 participants) mostly dealing with water and air issues related to animal agriculture production (12/5/2012).

South Dakota:

North Central Agricultural Research Laboratory (Brookings, SD)

- Hosted a Field Day on the hidden profitability of cover crops. Attended by more than 50 farmers, land managers, crop consultants, conservationists, researchers, and educators.

Texas:

Conservation & Production Research Laboratory (Bushland, TX)

- Co-hosted with Texas A&M AgriLife Research, Texas A&M AgriLife Extension Service, and West Texas A&M University at Bushland, TX a Small Grains Field Day on wheat and water issues. Attended by 135 producers, seed and agrochemical company representatives, water district employees, and research and extension faculty (5/24/2012).

Southern Plains Agricultural Research Center, Pecan Research Project (College Station, TX)

- Hosted a Field Day in association with the Texas Pecan Short Course. Attended by about 75 growers from the U.S. and Mexico (1/25/2012).
- Hosted a Pecan Field Day for about 25 University undergraduate students studying plant breeding (4/25/2012).

Southern Plains Agricultural Research Center, Aerial Application Technology Project (College Station, TX)

- Hosted a Field Day demonstrating modern aircraft nozzle technology to enhance on-target deposition and minimize off-target drift. Attended by over 50 aerial applicators and aerial application technology scientists from across the U.S. (8/1/2012).

Grassland, Soil, and Water Research Laboratory (Temple, TX)

- Hosted a Fertilizer, Poultry Litter and Grazing Field Day. Attended by about 75 producers, in addition to approximately 25 staff personnel from National Resources Conservation Service, Texas States Soil and Water Conservation Board, and Texas A&M AgriLIFE (10/21/2011).

Knipling-Bushland U.S. Livestock Insects Research Laboratory (Kerrville, TX)

- Hosted in conjunction with the annual meeting of the Texas Animal Health Commission – Cattle Fever Tick Committee a Field Day in Edinburg, Texas with hands-on demonstrations of fever tick rearing, field studies, demonstration of tick sampling in permanent quarantine zone, tick acaricide resistance assays, vaccine testing, evaluation of alternate mammal hosts, molecular/laboratory studies, and carrizo cane biological control in the permanent quarantine zone. Attended by about 60 stakeholders (9/12/2012).

Cotton Production and Processing Research Unit (Lubbock, TX)

- Along with the Cotton Technology Transfer Coordinator, hosted the annual National Cotton Ginners Association's Gin School. Classes focused on safety, pneumatics, machinery settings, maintenance, hydraulics, air quality, and history of cotton ginning. Attended by 142 students. A majority of students were from historically underserved populations (4/26-28/2012).
- Hosted a Chinese delegation for a tour presentation on the research being conducted (11/4/2011).

Plant Stress and Germplasm Development Unit (Lubbock, TX)

- Provided research overview and tour to the First Sorghum Leadership Class (9/5/2012), the United Sorghum Checkoff Board Executive Committee (7/30/2012 & 9/14/2012) [Sorghum Checkoff, USDA-ARS Focus on Sorghum Research Video: http://sorghumcheckoff.com/newsroom/videos-2/], representatives from six sorghum seed companies and Kansas State University & University of South Carolina (5-9/2012).
- Provided cotton research overview and tour to representatives from Cotton Incorporated (9/26/2012) and a Brazilian delegation (8/15/2012).
- Provided sorghum research overview for Ag Day Lubbock [Fox News Story and Video: http://www.myfoxlubbock.com/content/agdaylubbock/story/agriculture-farming-sorghum-research/wWKd3FoY9k-q023-fRT9yw.cspx] (6/8/2012).

Wind Erosion and Water Conservation Unit and Livestock Issues Research Unit (Lubbock, TX)

- Participated in USDA's Hispanic-Serving Institutions National Program by giving a tour and research presentations. Attended by 15 science teachers (8/6/2012).

Utah:

Poisonous Plant Research Laboratory (Logan, UT)

- Hosted a "Government Research in the Field of Agriculture" Field Day in Brigham City, UT regarding poisonous plant research as well as federal careers. Attended 65 students (Future Farmers of America) and 15 adults.
- Hosted "Toxic Effects of Selenium Containing Plants on Livestock" Field Day/Workshop in Soda Springs, ID. Attended by 20 mining company officials.
- Presented "Effect of Locoweed on Livestock Production in the Western United States" workshop to the Chinese Locoweed Delegation in San Francisco, CA. Attended by 50 Agriculture officials from Tibet and Mongolia, China.
- Presented at Society for Range Management Ranchers Forum and webinar in Spokane, WA regarding managing lupine on the channel scablands. Attended by approximately 300 stakeholders and producers in four states.
- Hosted "Tremetol-containing Plants in your Area" Field Day/Workshop in Kingman, AZ. Attended by 60 extension agents, veterinarians and ranchers.
- Presented at 8 "Various Poisonous Plants that Cause Problems" Field Days/Workshops throughout Idaho and Utah. Attended by over 500 ranchers, land managers, and federal, state, county extension personnel and weed control specialists.
- Presented "Identification and Control of Poisonous Range Plants" workshop at Northwest Intertribal Agriculture Council Conference at Fort Hall, ID.

Forage and Range Research Laboratory (Logan, UT)

- Hosted a Field Day as part of the sixth International Meeting on Molecular Biology of Forage and Turf in Salt Lake City and Cache Valley, UT, highlighting research on pasture, rangelands, and turf grass. Attended by 115 scientists and extension specialists (6/3-7/2012).

Pollinating Insect – Biology, Management Systems Research Unit (Logan, UT)

- Hosted a booth at Logan Farmers' Market's National Pollinator Week highlighting research on bee diversity and the importance of bees for pollination. Attended by over a hundred people (6/16/2012).
- Conducted a bumble bee workshop highlighting how to identify different species of bumble bees, their importance for pollination, issues associated with their conservation, methods for using them for pollination, and hands-on methods for bumble bee rearing. Attend by 87 agricultural producers and the general public (6/20/2012).
- Conducted a workshop at Utah State University on native pollinators and suggestions for integrating these pollinators into land management policies and practices. Attended by 6 state and federal land managers (9/12/2012).
- Participated in teaching a nine-day workshop sponsored by the American Museum of Natural History. The course provides botanist, conservation biologists, and ecologists the knowledge and experience needed to understand bee taxonomy and identification tools, applicable to the global bee fauna. Attended by 23 people (9/10-20/2012).

Washington:

Land Management and Water Conservation Research Unit, Pullman

- Hosted and presented a field day in Bridgeport/Okanogan WA. Presented research on weed management in canola, and varieties of winter canola to forty attendees. (5/2012).
- Co-hosted a REACCH field day in Ralston, WA. Presented research and described the use of a stripper header to increase residue (to eliminate the traditional, tillage fallow of the region) to fifty attendees (6/2012).

Wheat Genetics, Quality, Physiology, and Disease Research Unit, Pullman

- Presented research progress at the 2012 Wheat and Barley Research Progress Review, Pullman, Washington to about 80 stakeholders (02/16/2012)
- Presented research progress at the Stripe Rust Extension Meeting, Pullman, Washington to 20 stakeholders and researchers. (03/06/2012)
- Presented research progress at the Whitman Growers Board Meeting, Pullman, Washington to 10 stakeholders (06/04/2012)
- Hosted five Canadian cereal breeders and pathologists showing field experiments and presented research progress (06/20, 07/02-07/05, 2012)
- Co-hosted the 2012 WERA97 meeting and participated in the Western Wheat Workers and Western Crop Science meetings, Pullman, Washington, showing field experiments and presented research progress to over 100 researchers (07/11-13/2012)
- Hosted five Pakistani wheat breeders and pathologists, showing research techniques and presenting research progress (07/15 -08/02, 2012)

Wheat Genetics, Quality, Physiology, and Disease Research Unit--Western Wheat Quality Laboratory, Pullman

- Hosted Newspaper & Trade Journal Writers on food topics in conjunction with Shephard's Grain, Reardan, WA; gave basic tour of the facilities with explanation as to our purpose and history (10/4/2011, 20 people attending)
- Hosted Mater Farms owners; gave basic tour of the facilities with explanation about quality testing & procedures (10/27/2011, 3 people attending)
- Hosted Research Review group; gave basic tour of the facilities with explanation about procedures, testing, milling, and baking (2/15/2012, 15 people attending)
- Hosted University of Idaho Food Science Class. Gave basic tour of facilities with explanation about procedures, testing, milling, and baking (3/21/2012, 3/23/12)
- Assisted in hosting Ag Exposition; gave basic tour of facilities with explanation about procedures, testing, milling, and baking (4/2/2012, 29 people attending)
- Hosted Washington State University Food Science and Crop Science Classes. (4/17/2012, 4/19/12, 9/17/12)
- Hosted Washington Grain Alliance/Idaho Wheat Commission Wheat Workshop (Cereal School) for Wheat Growers; Hands-on workshop exploring various facets of Wheat Quality Lab testing and grading (6/13/2012, 20 people attending)
- Hosted Washington Grain Alliance/Idaho Wheat Commission Wheat Workshop (Cereal School) for Wheat Industry Persons (mostly Bakers); Hands-on workshop exploring various facets of Wheat Quality Lab testing and grading (6/14/2012, 20 people attending)
- Hosted Argentinian trade team; basic tour of facilities with explanation as to our purpose and history and explanation of testing, milling, and baking procedures (8/9/2012, 3 people attending)
- Hosted Nisshin group; basic tour of facilities with explanation as to our purpose and history and explanation of testing, milling, and baking procedures (8/14/2012, 5 people attending)

Grain Legume Genetics and Physiology Research Unit, Pullman

- Hosted a "Twilight Tour" of the Cool Season Food Legume Breeding Program at Spillman Farm in Pullman, WA, where visitors could look at field plots. This tour was attended by over 50 growers, producers and industry representatives. (8/31/12)
- Hosted employees of Columbia Grain (2 visitors attending): Review of pea, lentil, and chickpea advanced breeding lines. (1/13/12)
- Hosted employees of Spokane Seed (7 visitors attending): Review of pea, lentil, and chickpea advanced breeding lines. (1/12/12)
- Hosted employees of Pacific Northwest Growers' Cooperative (8 visitors attending): Review of pea, lentil, and chickpea advanced breeding lines. (12/15/12)

West Virginia:

Innovative Fruit Production, Improvement and Protection Unit (Kearneysville, WV)

- Demonstrated rotating cross-arm trellis technology at field days in Circleville, OH (11/2011), Thurmond, MD (6/2012), and Kearneysville, WV.

Wisconsin:

U.S. Dairy Forage Research Center

- Interacted with thousands of dairy producers through World Dairy Expo in Madison, WI. Organized 7 educational seminars on dairy and forage issues (10/04/2011).
- Hosted the Wisconsin Grazing Teaching and Technology Conference at its research farm near Prairie du Sac. Participation included 40 grazing extension specialists, grazing coordinators and farmers (08/28/2012).

Wyoming:

High Plains Grasslands Research Station Rangeland Resources Research (Cheyenne, WY)

- Developed a Stakeholder Group for the new Adaptive Grazing Management experiment at the Central Plains Experimental Range. The Group provided input into goals/outcomes for the new study, objectives, monitoring data needed, decision triggers for moving livestock between pastures during the grazing season, and developing a grazing management plan for ten pastures at the Central Plains Experimental Range (9/18 – 19/12).

Puerto Rico:

Tropical Agriculture Research Station (Mayaguez, PR)

- Provided hands on training on grafting and other propagation procedures to socially disadvantaged growers of tropical fruits in Puerto Rico.
- Participated in activities targeting minority, historically under-served operators/stakeholders by providing information on alternative high-cash crops and best management practices to Hispanic producers in rural areas through farm visits, hosting growers at experimental sites, and on-farm research at Martex Farms and La Balear Farm in Santa Isabel and Adjuntas, Puerto Rico, respectively.
- Participated with Texas A&M University in the Future Scientists Program funded by the National Science Foundation to introduce Hispanic high school teachers to ARS research and take that information back to the classroom to benefit their students.
- Co-hosted the bi-annual Bean Improvement Cooperative meeting in San Juan, Puerto Rico (11/2011).
- Hosted official web site of PROCINORTE's Taskforce on Tropical and subtropical Fruits to improve links between Mexico, Canada and the United States for research issues related to production, quality, safety and traceability of tropical and subtropical fruits. This website disseminates information on work conducted by Taskforce members pertaining to production and quality of tropical/subtropical fruits.
- Served as a horticulture advisor on a newly formed group of Puerto Rican cacao farmers/growers.

3.10. ARS Technology Transfer Award Winners

2012 ARS Technology Transfer Awards

Technology Transfer Category

Scientists: Dr. Bob Danka et al., Honey Bee Breeding, Genetics & Physiology Laboratory, Baton Rouge, Louisiana
Title: Honey Bees with Varroa Sensitive Hygiene
Award: ARS Outstanding Award

Scientists: Dr. Jonathan Frantz et al., Application Technology Research Unit, Toledo Ohio
Title: Virtual Grower Software for Greenhouse Crop Production
Award: ARS Outstanding Award

Scientists: Dr. Jorge Delgado, Soil Plant nutrient Research Unit, Fort Collins, Colorado
Title: Advances in Tools to Manage Nitrogen
Award: ARS Superior Award

Scientists: Dr. Fumiomi Takeda et al., Appalachian Fruit Research Station, Kearneysville, West Virginia
Title: Development and Technology Transfer of Commercial Rotating Cross-Arm Trellis and Cane Training System for Blackberry Production
Award: ARS Superior Award

Scientists: Dr. Daniel Pote et al., Dale Bumpers Small Farms Research Center, Booneville, Arizona
Title: A Novel Tractor-Drawn Machine (Poultry Litter Subsurfer) that Applies Dry Poultry Litter below the Surface of Pasture/No-Till Systems
Award: ARS Superior Award

Scientists: Dr. Roger Sheley et al., Eastern Oregon Agricultural Research Center, Burns, Oregon
Title: Ecologically-based Invasive Plant Management (EPIBM) of Invasive Annual Grasses
Award: ARS Superior Award

Sustained Effort Category

Scientists: Dr. Steven Evett et al., Conservation & Production Research Laboratory, Bushland, Texas
Title: Soil Water Sensing and Measurement Technology and Tools for Environmental and Water Management
Award: ARS Outstanding Award

Scientists: Dr. Donald Knowles et al., Animal Disease Research Unit, Pullman, Washington
Title: Control of a Re-Emergent Exotic Disease (Babesiosis) in U.S. Livestock through Provision

of Modern Diagnostics and Chemotherapeutics
Award: ARS Superior Award

2012 Federal Laboratories Consortium (FLC) Awards

Scientists: Dr. Bob Danka, Dr. Jeff Harris, Tom Glenn, and Suki Glenn, Honey Bee Breeding, Genetics and Physiology Laboratory, Baton Rouge, Louisiana
Title: Honey Bees with Varroa Sensitive Hygiene
Award: National Excellence in Technology Transfer

Scientists: Dr. Jonathan Frantz, Byron Hand, Deanna Bobak, Erik Runkle, and Lee Buckingham, Toledo, Ohio
Title: Virtual Grower Software for Greenhouse Crop Production
Award: National Excellence in Technology Transfer

Scientists: Roger Sheley, Brenda Smith, Stuart Hardegree, Thomas Monaco, and Ryan Steineckert, Eastern Oregon Agricultural Research Center, Burns, Oregon
Title: Ecologically-Based Invasive Plant Management of Invasive Annual Grasses
Award: National Excellence in Technology Transfer

Name: Mr. Victor Chavez, Technology Transfer Coordinator, North Atlantic Area
Award: Harold Metcalf

Lab: USDA Agricultural Research Service, Midwest Area
Title: Development and Deployment of the GRIN-Global System for Global Plant Genetic Resource Management
Award: Midwest Region Excellence in Technology Transfer

Scientist: Dr. Donald Knowles, Animal Disease Research Unit, Pullman, Washington
Title: Control of a re-emergent exotic disease (*Babesiosis*) in U.S. livestock through provision of modern diagnostics and chemotherapeutics
Award: Far West Region Outstanding Commercialization Success

Scientists: Dr. Eric Jang and Dr. Spencer Walse, U.S. Pacific Basin Agricultural Research Center and San Joaquin Valley Agricultural Sciences Center, Hilo, Hawaii and Parlier, California
Title: Systems approach for allowing movement of high-value agricultural foodstuffs from state and federal quarantine areas
Award: Far West Region Outstanding Commercialization Success

Scientist: Dr. Walter Mahaffee, Horticulture Crops Research Unit, Corvallis, Oregon
Title: Inoculum detection to aid disease management of grape powdery mildew
Award: Far West Region Outstanding Commercialization Success

Scientist: Dr. W. Clint Hoffmann, Area Wide Pest Management Research, College Station, Texas
Title: Aerial Application Air Tractor Water Droplet
Award: Mid-Continent Region Outstanding STEM Mentorship

Scientists: Dr. Bradley K. Fritz and W. Clint Hoffmann, Southern Plains Agricultural Research Center, College Station, Texas
Title: First-ever USDA ARS Smartphone app for pesticide spray control
Award: Mid- Continent Region Excellence in Technology Transfer

Scientists: Dr. Daniel H. Pote and Mr. Stephen M. Haller, Dale Bumpers Small Farms Research Center, Booneville, Arizona
Title: Poultry Litter Subsurfer
Award: Mid- Continent Region Notable Technology Development

Agency: Department of Agriculture
Award: Mid-Atlantic Region Interagency Partnership Award

Scientists: Dr. Xixuan Jin, Mr. Dan Custis and Mr. Robert Elliott, Biological Control of Pests Research Unit, Stoneville, Mississippi
Title: Method for encapsulation of Microparticles
Award: Southeast Region Excellence in Technology Transfer

Scientists: Dr. Juan A. Morales, Dr. David I. Shapiro-IIan, Dr. M. Guadalupe Rojas and Mr. W. Louis Tedders, Biological Control of Pests Research Unit, Stoneville, Mississippi
Title: In-Vivo production of Entomopathogenic Nematodes
Award: Southeast Region Excellence in Technology Transfer

3.11. Selected Metric Charts (data from Tables 1-7)

Figure 1. Number of CRADAs executed for FY2008-FY 2012.

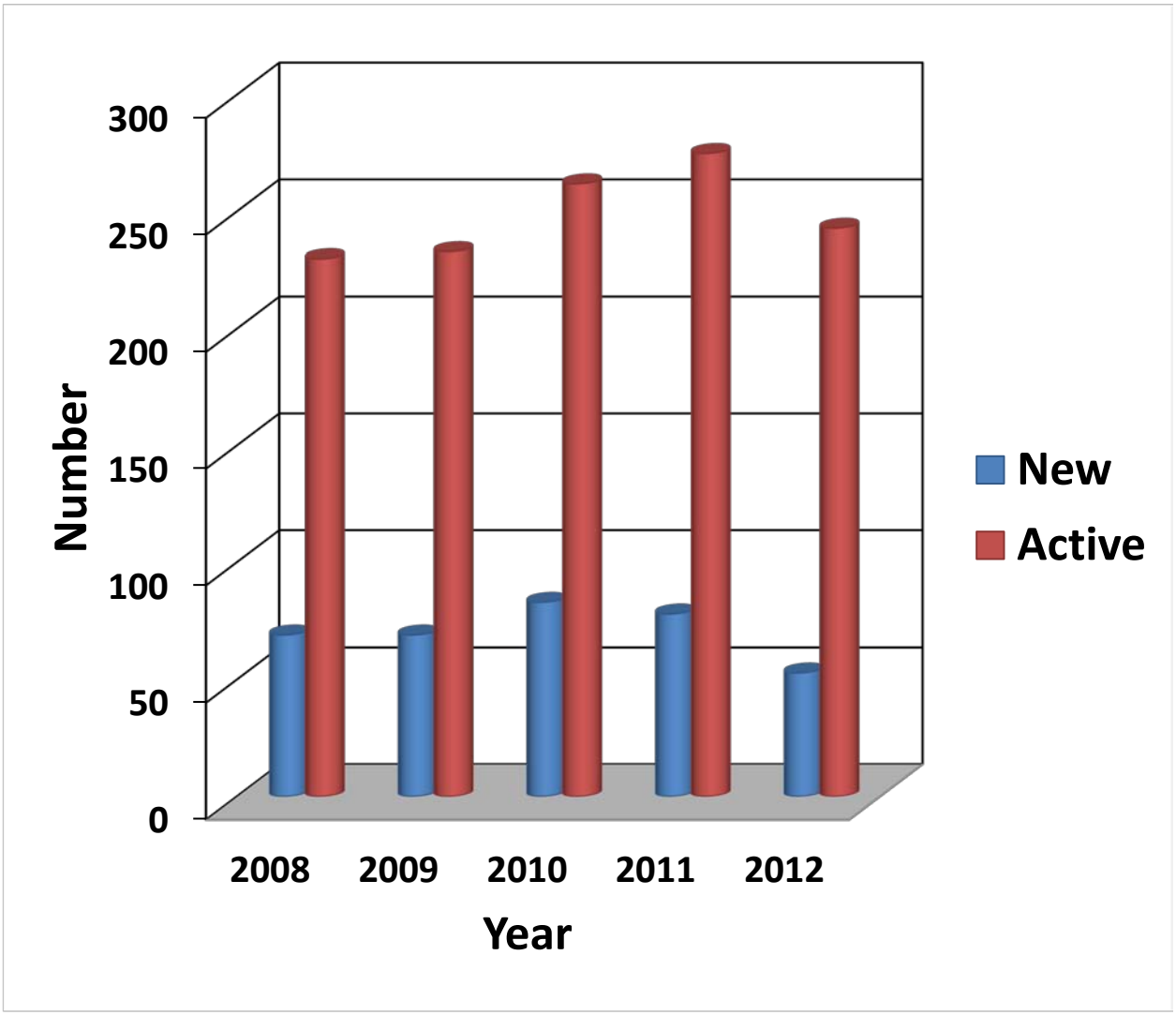


Figure 2. Number of new CRADA and other R&D agreements per scientists executed for FY2008-FY 2012. In FY 2012, there were 1835 scientists and 1,172 newly executed CRADA and other R&D agreements.

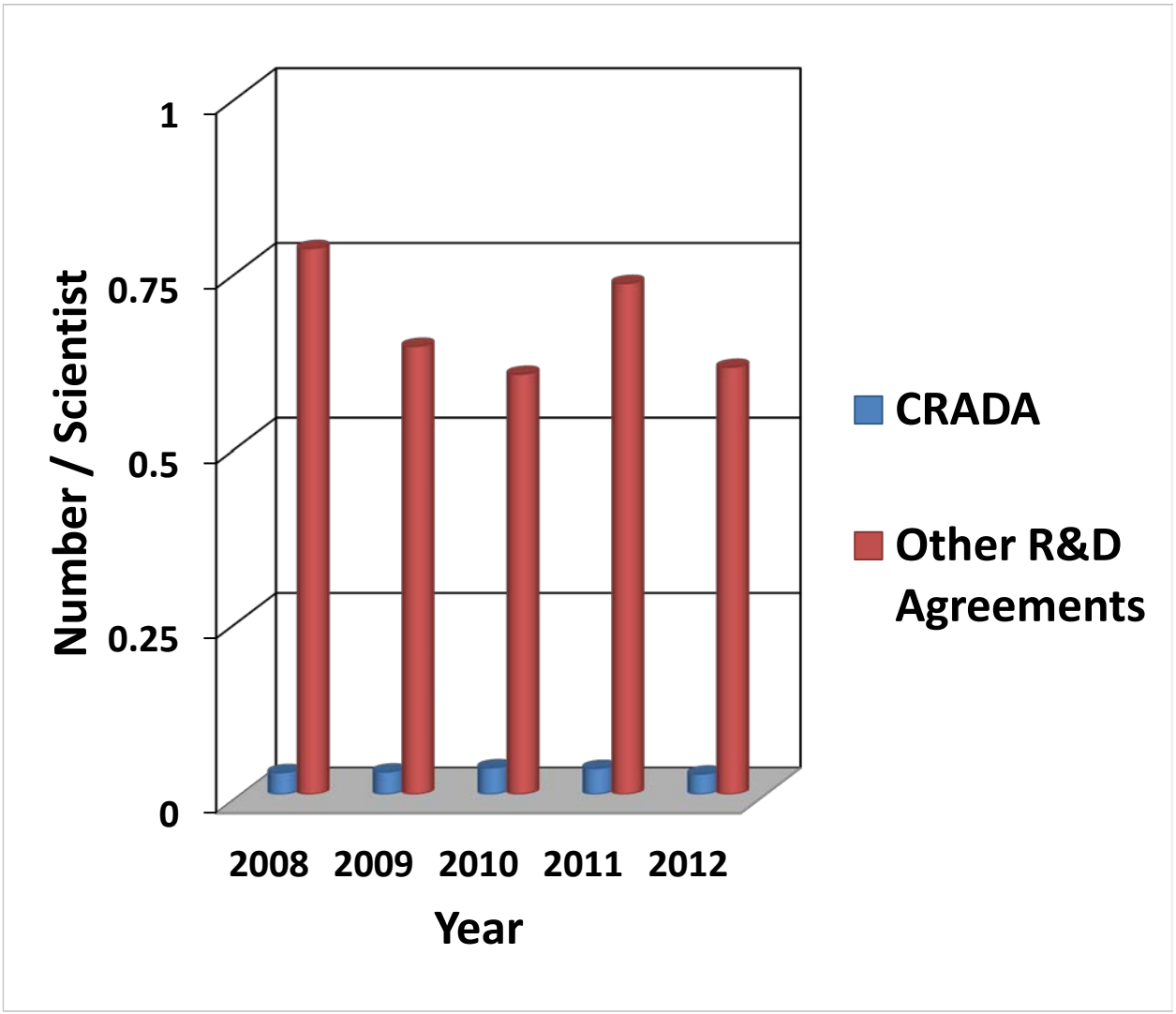


Figure 3. Percent of total of technology transfer agreements by type in FY 2012.

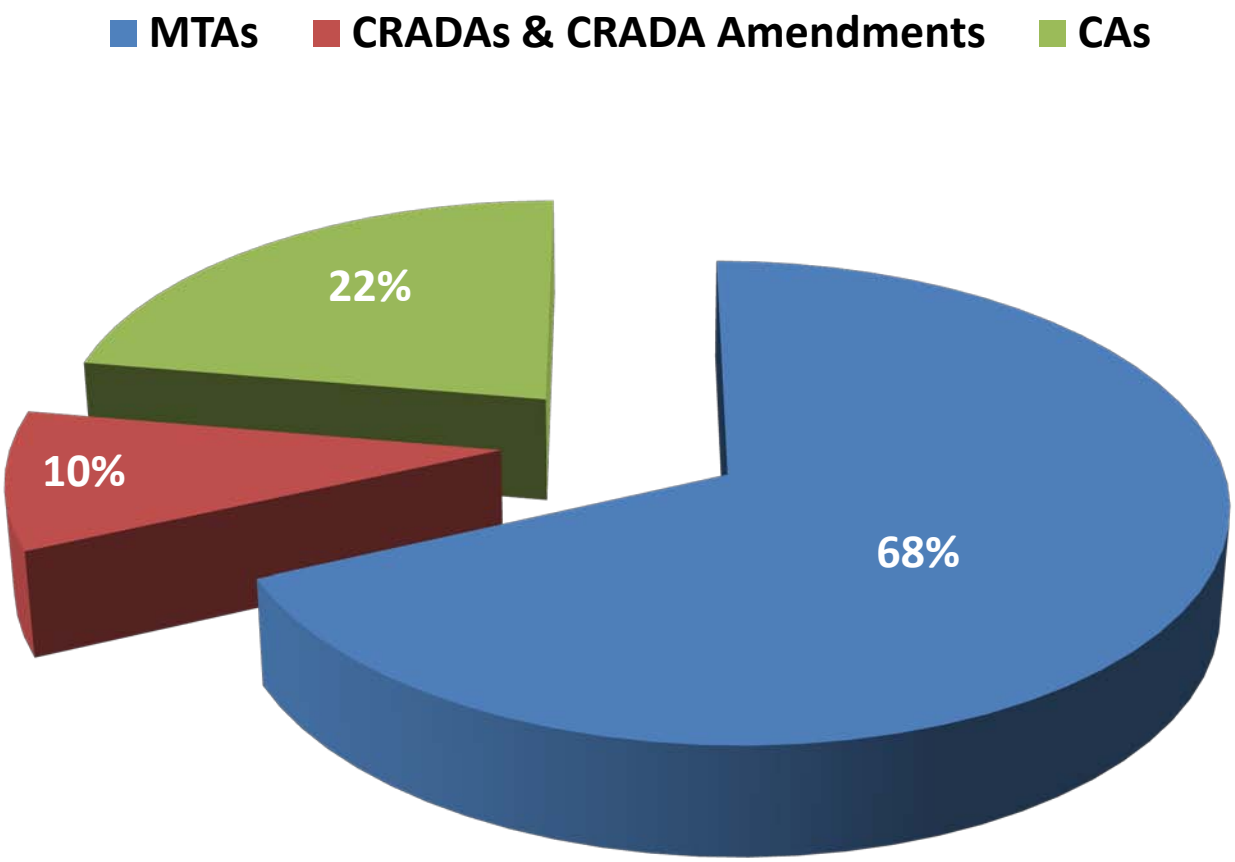


Figure 4. Number of invention disclosures, patent applications filed and patents issued.

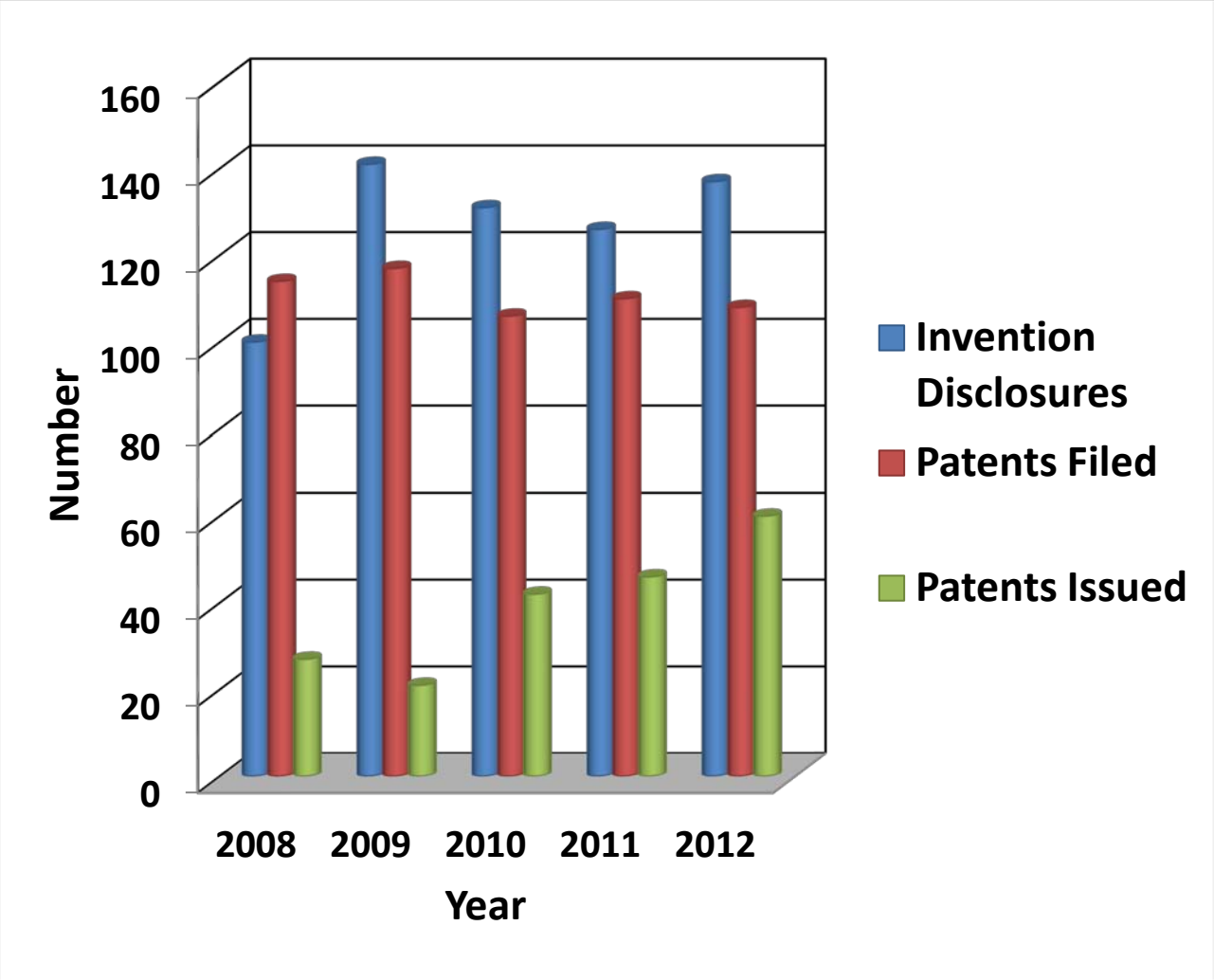


Figure 5. Number of new invention disclosures per scientists executed for FY2008-FY 2012. In FY 2012, there were 1835 scientists and 76 new invention disclosures.

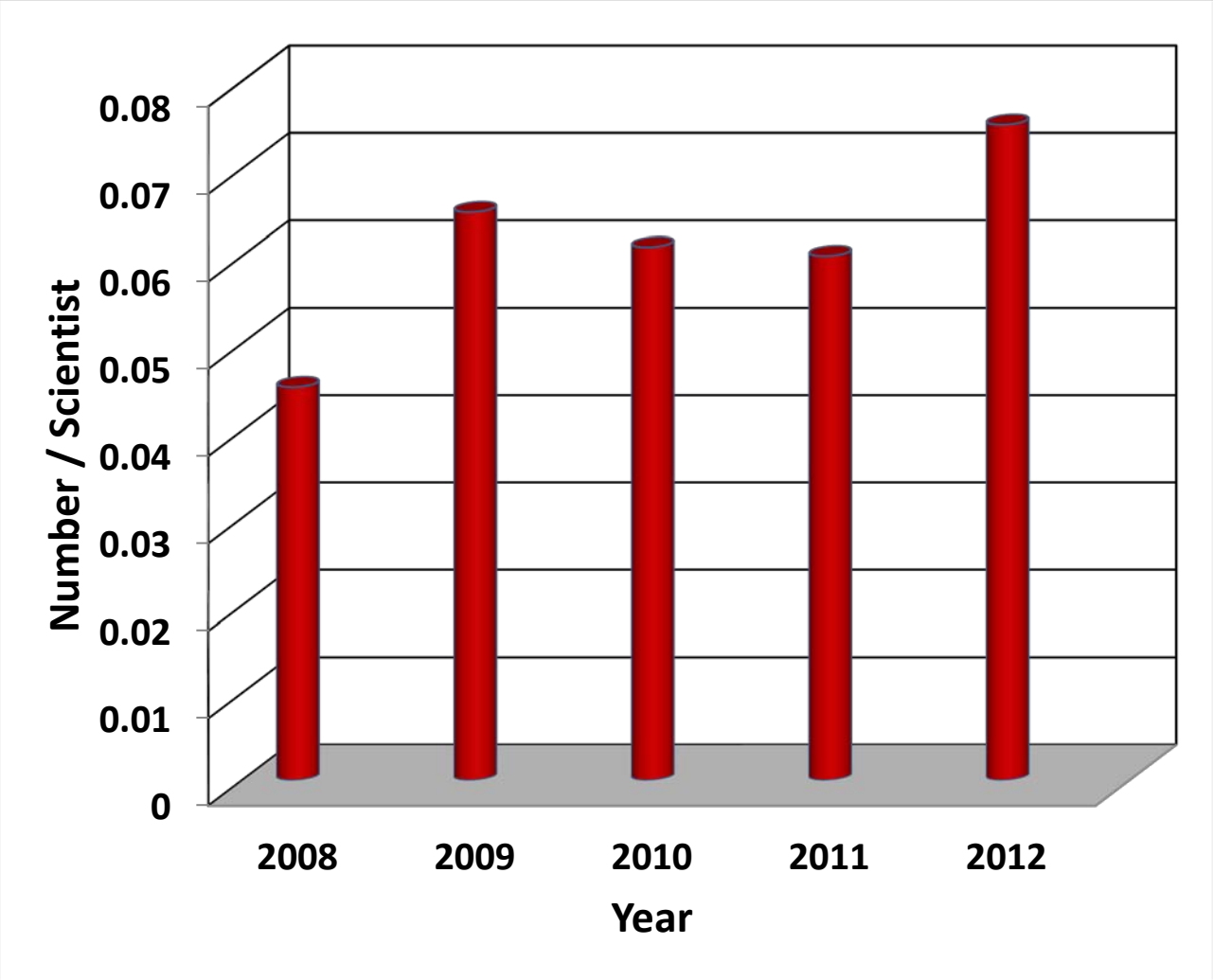


Figure 6. Number of new invention disclosures received in FY2012 based upon scientific discipline.

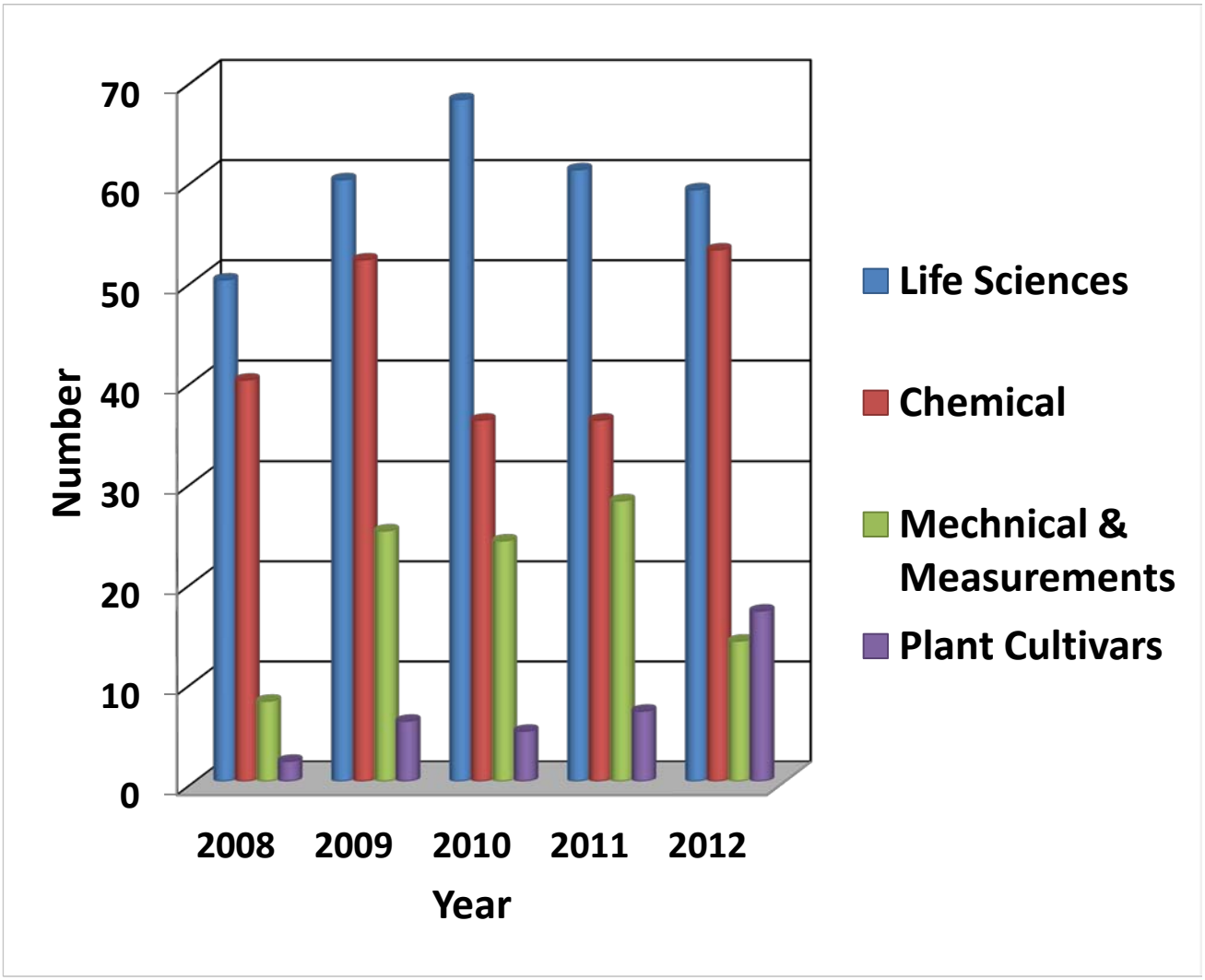


Figure 7. Percentage of new invention disclosures in each scientific discipline that are University-ARS co-owned in FY2012.

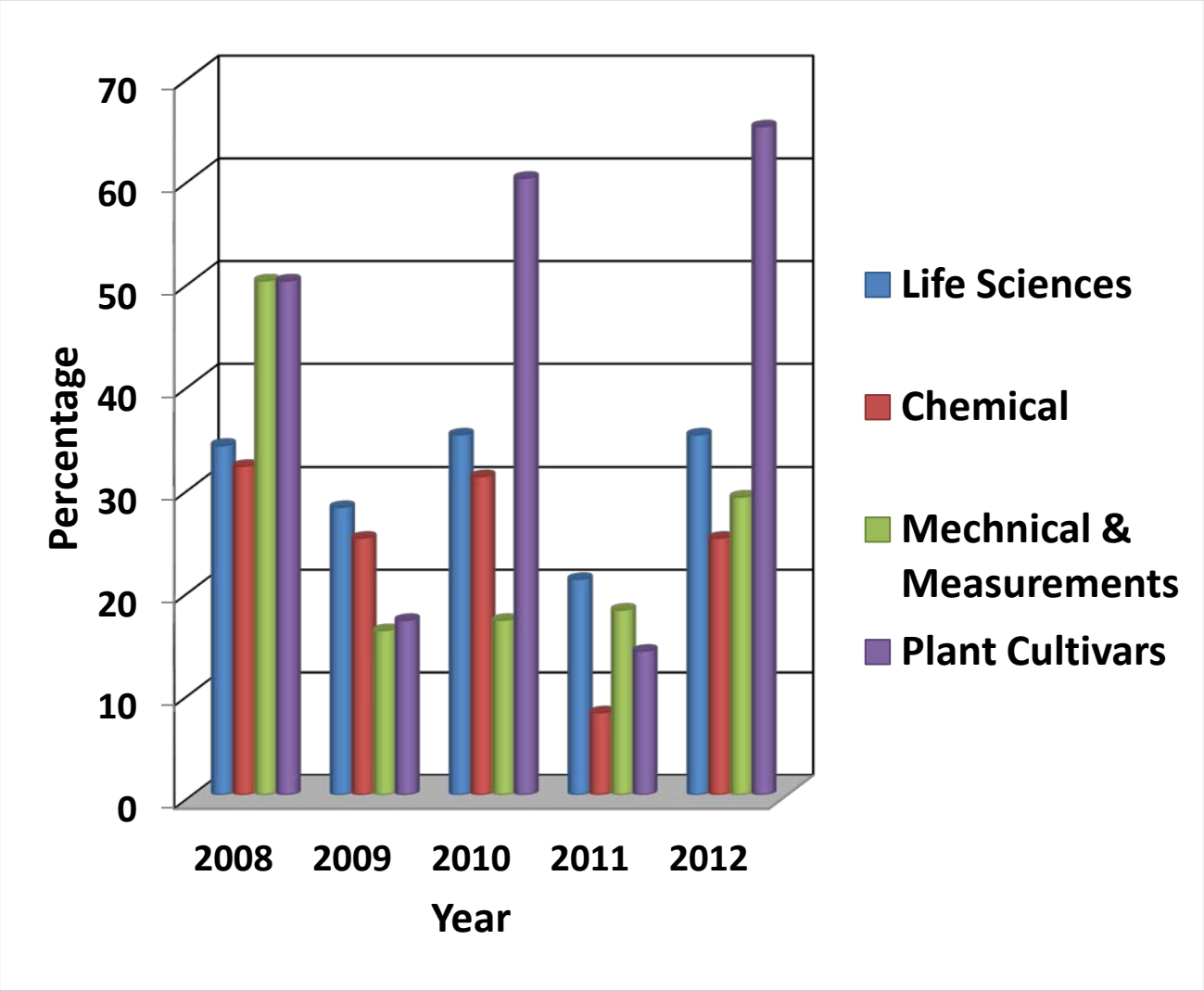


Figure 8. Percent of total of the new licenses executed in FY 2011 by business type.

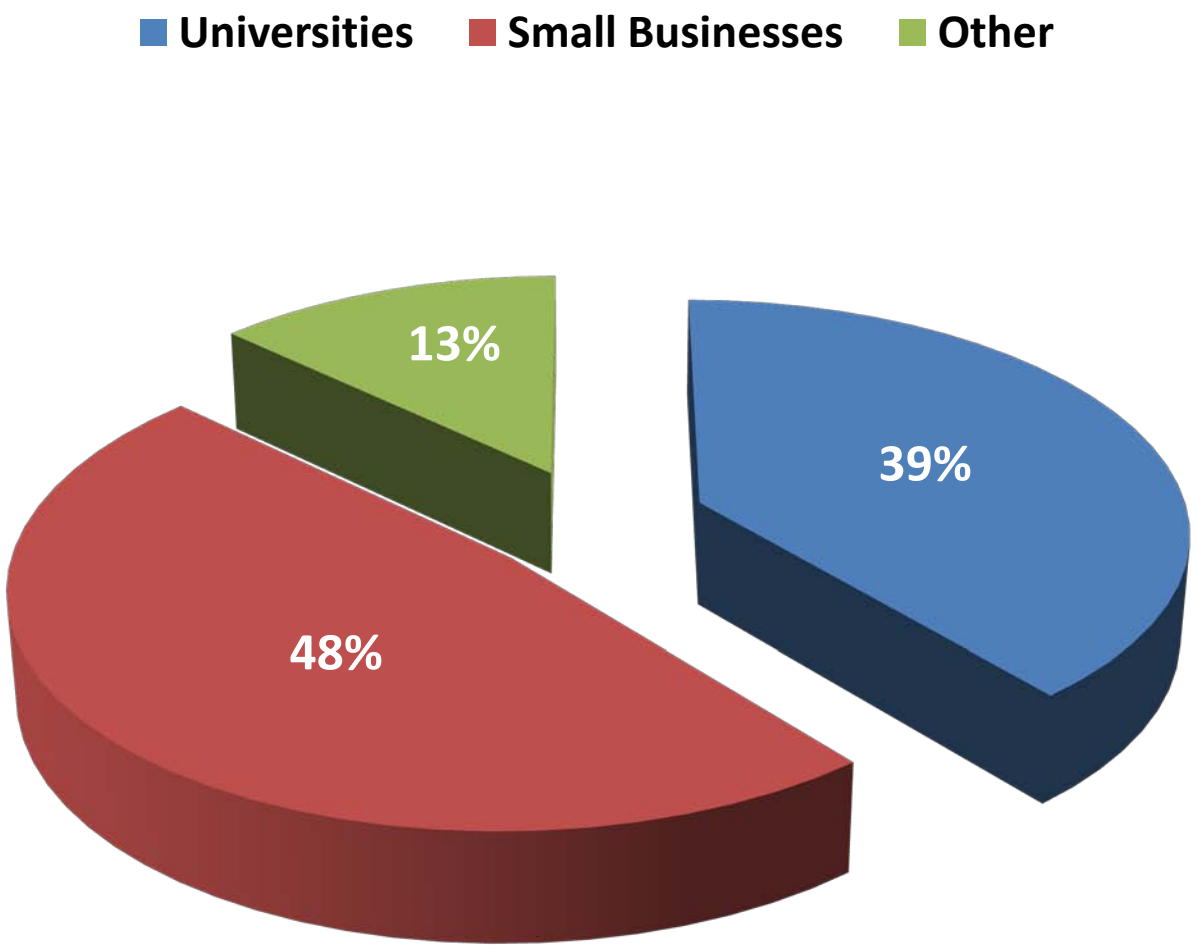


Figure 9. Percent of total of revenue generated by the top five licenses in FY2012.

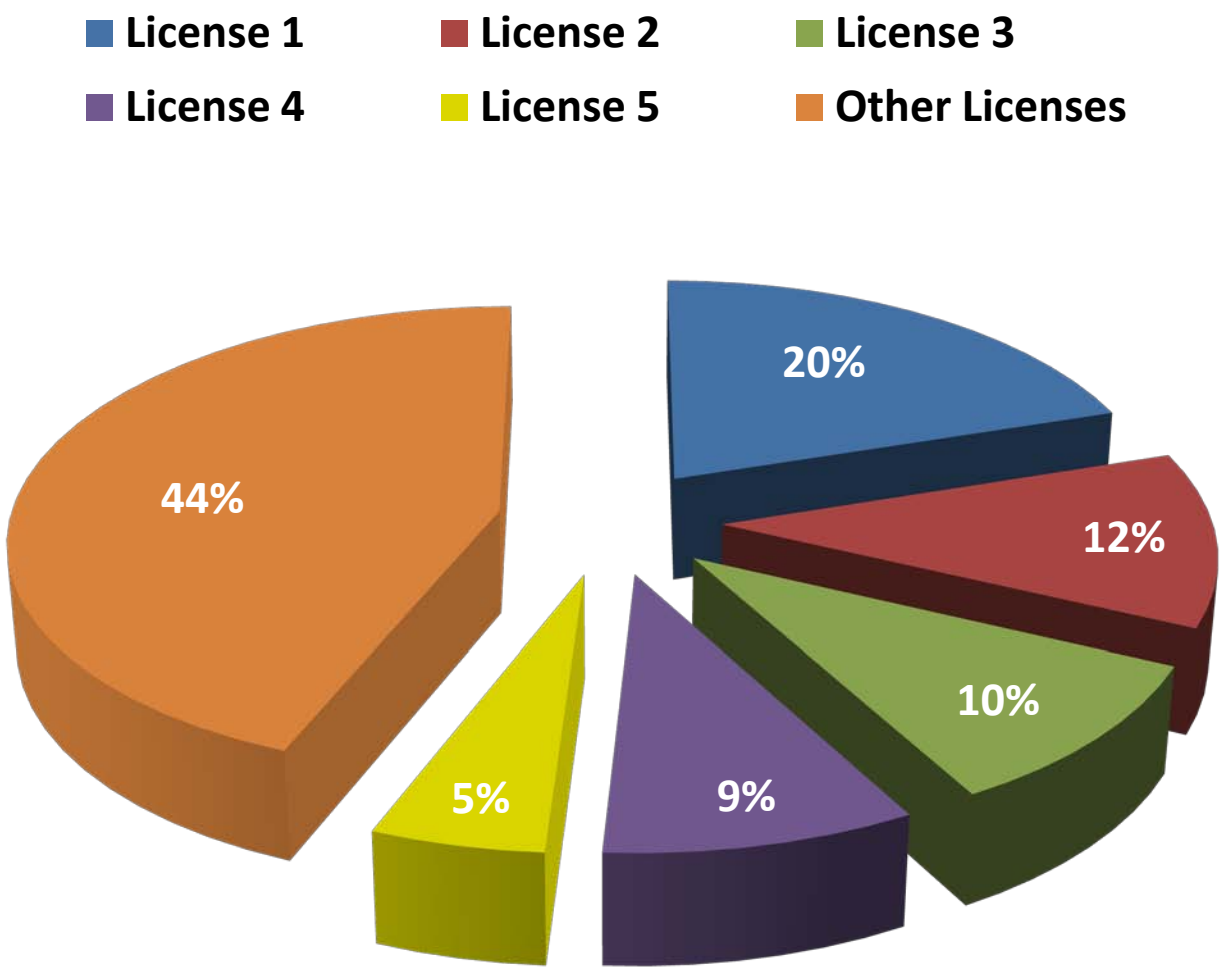
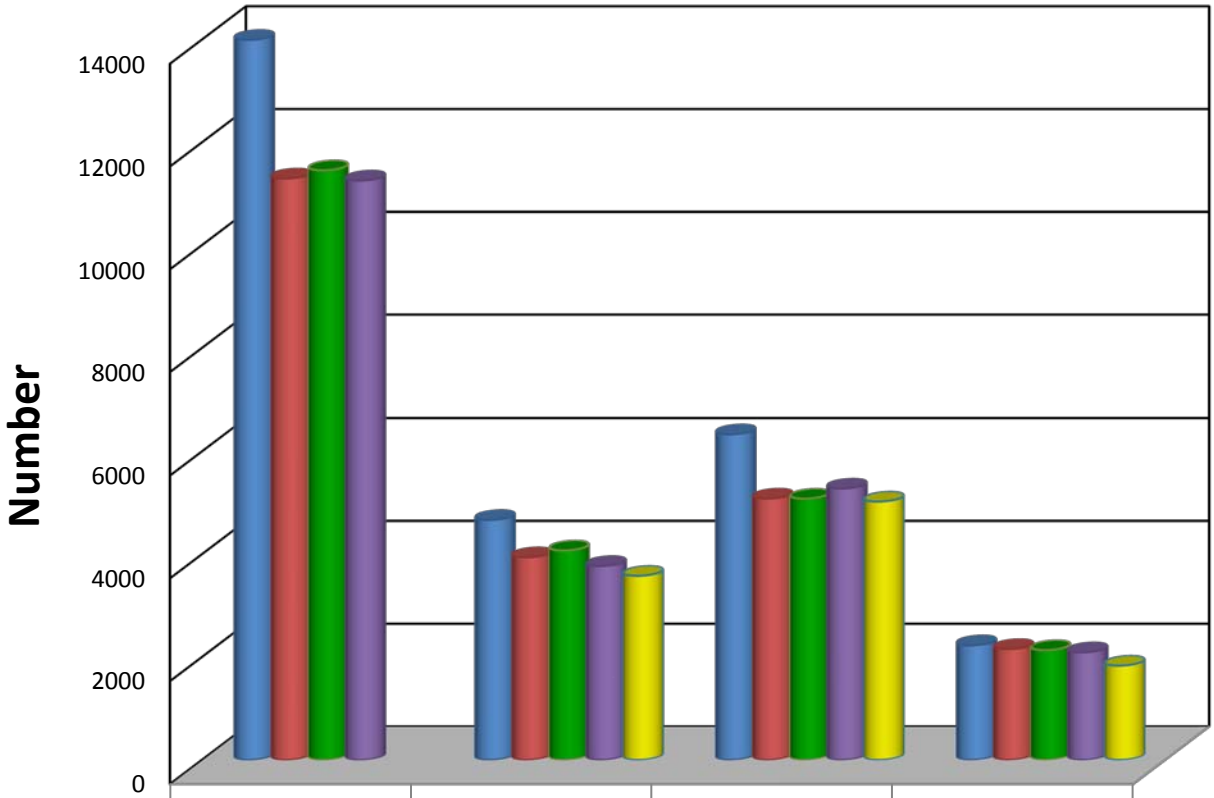


Figure 10. Number of ARS-approved publications for FY2008-FY2012.



	Total Publications	Abstracts	Peer Reviewed Publications	Scientists
2008	13996	4669	6335	2230
2009	11300	3943	5085	2157
2010	11459	4076	5083	2136
2011	11260	3773	5279	2094
2012		3582	5027	1835

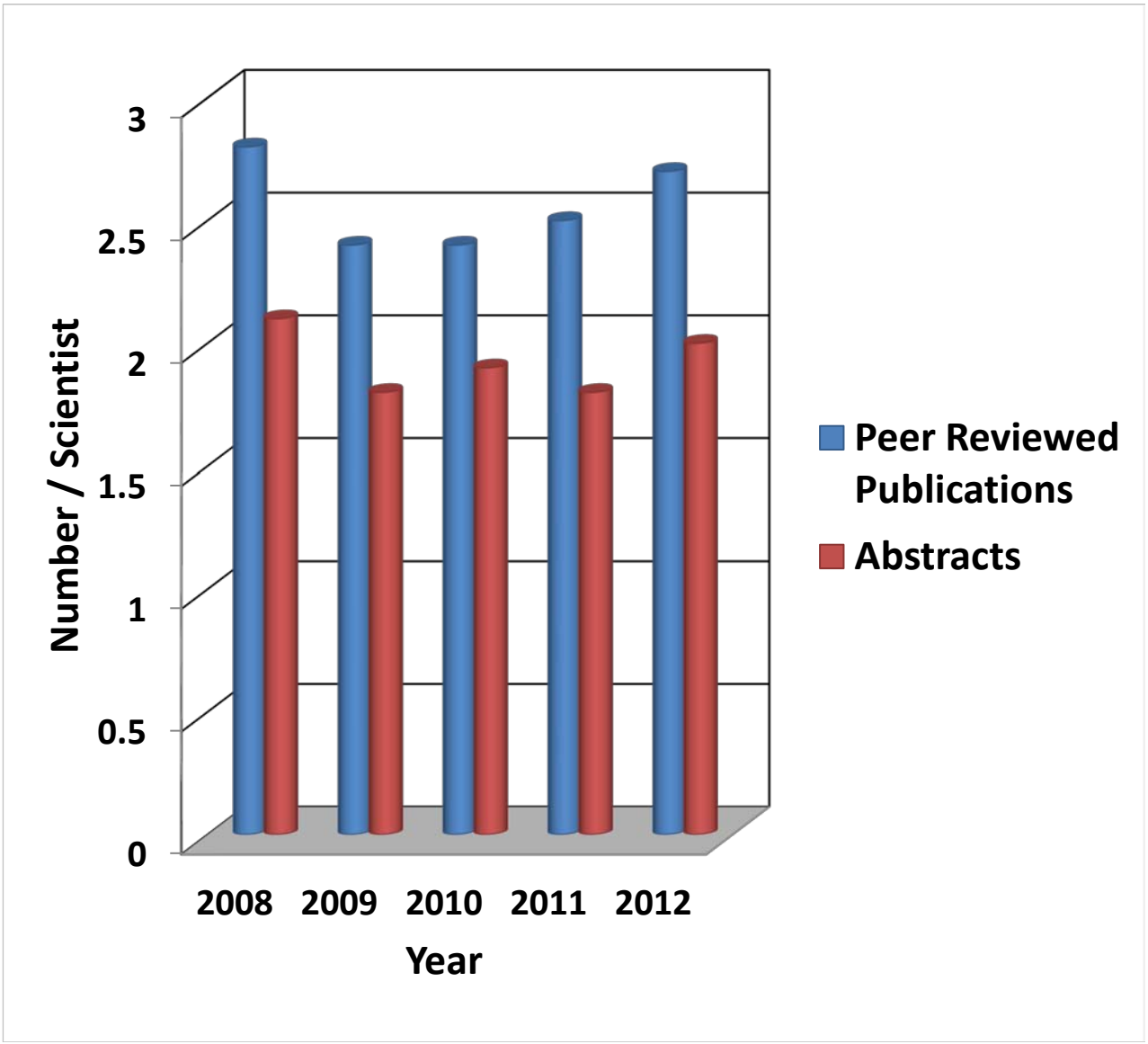



Figure 11. Number of peer reviewed publications and abstracts per scientist for FY2008-FY 2012.