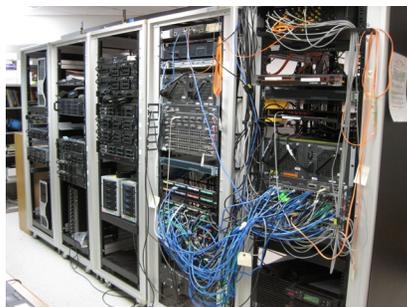


Scientific Information Resources

Scientific information, an integral part of the research mission, links the scientists to present, past, and future knowledge and technology. The Group utilizes innovative networking, new technologies, and electronic methodologies to complement and augment research priorities. Our primary goals include providing solutions for the identification and location of research literature, facilitating access and ease of use, and value-added enhancement of scientific information.



Research Data Systems



This Core resource supports the networking infrastructure to serve the Center's research program. Part of that support involves the various main-

tenance and security issues of the campus-wide digital network and its links to the Internet. Support is also available for a wide variety of networked devices in the offices, laboratories, and pilot plant. The central computing center in the main building provides a controlled environment for rack-mounted servers and communications equipment which provides shared storage, web servers, backup devices, and databases for management and scientific information. Collaboration with the scientific staff supports the local research program while collaboration with the Agency and Department supports broader IT initiatives.

Core Technologies Mission

As a center-wide resource, Core Technologies provides all ERRC research scientists equal access to state-of-the-art research instrumentation, sophisticated research data processing methodologies, contemporary electronic research information resources and expert intellectual capital. Funding is provided by Shared Research Costs since it benefits all of ERRC's CRIS projects. This assures proper planning and sufficient funds to meet modern expectations for multidisciplinary and collaborative research with increased scientific impact. Core Technologies is supervised by the Center Director and the overall operation is oriented to assure that ERRC scientists and engineers needs are met, priorities properly set, and research problems resolved.

ARS Mission

The Agricultural Research Service 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 the natural resource base and the environment; and
- provide economic opportunities for rural citizens, communities, and society as a whole.

On the World Wide Web:

www.ars.usda.gov/nea/errc/ct

USDA is an equal opportunity provider and employer.

April 2015



United States Department of Agriculture
Agricultural Research Service
Eastern Regional Research Center
Wyndmoor, Pennsylvania 19038

Core Technologies at ERRC



Resources for Research

Core Technologies includes the ERRC's Research Data Systems, Scientific Information Resources, Microscopic Imaging, Genetics Analysis, Magnetic Resonance Spectroscopy, and Mass Spectrometry units. All components of Core Technologies are housed on-site at ERRC, providing the instrumentation scientists need for research as well as the necessary support to use these new technologies effectively. Our staff provides assistance in the planning of research projects, expertise in the use of the instrumentation, and consultation to help understand and interpret results. Collaboration is encouraged for more involved projects or for researchers who need more support. Access to these resources and expertise provides an invaluable advantage for researchers who are working on important projects supporting food technologies, agricultural commodities, and industrial processes. Core teams also offer training initiatives and career development opportunities by working with individuals and groups to help researchers utilize advanced instrumentation.

Microscopic Imaging



Modern integrated imaging is achieved with four sophisticated microscope

systems. The Quanta 200 FEG Environmental Scanning Electron Microscope incorporates a Schottky field emission gun for extremely high resolutions. The Nanoscope IIIa Multimode Scanning Probe Microscope is used as an Atomic Force Microscope. The multiple scanner heads and components of this instrument support a full range of probes for surface characterization studies. The CM12 Cryo-Version Scanning-Transmission Electron Microscope supports projects requiring high spatial resolution in bright field images and cryogenic conditions to visualize the micro and nanostructure of thin frozen samples. The TCS-SP Confocal Laser Scanning Microscope is an imaging spectrophotometer for both fluorescence and reflection. Four flexible channels of detection can gather convoluted sets of optical sections to generate 3-D images. The high quality lenses of this instrument support imaging into the sub-micrometer range under native conditions. Together these microscopes allow scientists to develop new and improved methods of imaging to resolve important problems concerning the special aspects of agricultural commodities and food safety.

Genetic Analysis

The Genetic Analysis facility provides automated DNA Sanger sequencing, and bioinformatics analysis. The collection and analysis of Sanger sequence data is achieved using the Applied Biosystems (Life



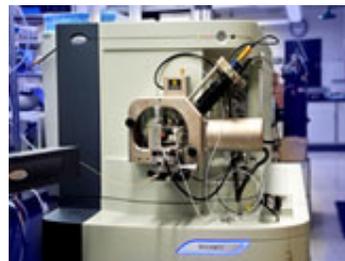
Technologies) 3730 DNA Analyzer. Support is provided to researchers on template preparation, primer design, data interpretation, sequence editing, and gene walking. Bioinformatic analysis on Next Generation Sequencing projects is provided through the use of Genetic Analysis Core software, including Gene Codes Sequencher, CLC Genomics Workbench, DNASTAR Navigator, Mauve alignment of multiple genome sequences, and the Galaxy genomic analysis platform.

Mass Spectrometry

The Mass Spectrometry resource utilizes high-resolution instrumentation for the analysis of variety of samples related to ARS research.



The instruments include a 4700 Proteomics Analyzer - Matrix Assisted Laser Desorption Ionization with time of flight-tandem mass spectrometer (MALDI TOF/TOF). This high-throughput instrument supports research projects requiring large molecules identification, with special application for gel electrophoresis protein-spot analysis. Alternatively, the utilization of capillary or nano-ultra high performance liquid chromatography (UHPLC) in association with a Q-TOF (Synapt G1) mass spectrometer allows the analysis in the range of small molecules to protein using atmospheric pressure ionization (ESI and APCI) with great mass accuracy. This instrument has the capability for



proteomic studies using the MudPIT approach. Other analyses includes lipids, oligosaccharides, oligomers, regulated veterinary drugs and small molecules (200 to 1000 Da).

Magnetic Resonance Spectroscopy

The Magnetic Resonance facility supports the research of ARS scientists and engineers by providing answers for investigations involving foodstuffs, plant and soil extracts, and value-added agricultural products and by-products. The facility addresses questions requiring the determination of (bio)chemical composition, properties and structures. Examples of its uses include food composition, authenticity and origins, metabolite analysis and metabolic processes, biomolecular properties and structures (such as polysaccharides, fats and oils, peptides), and chemometric analyses of biofuels. The facility houses three super-conducting NMR spectrometers: An Agilent VNMRs 14.1 Tesla (600 MHz), a Varian Inova 9.2 Tesla (400MHz), and a Varian Mercury 4.7 Tesla (200 MHz). Together these instruments can provide a full spectrum of analytical techniques using modern multidimensional and multinuclear experiments, as well as multivariate statistical analysis, and diffusion and hydrodynamic radius determinations. Most NMR-active nuclei can be detected, especially: ^1H , ^{13}C , ^{15}N , and ^{31}P . The required concentration for ^1H -NMR spectra may be as low as 50 nanomolar, with sample volumes as small as 60 microliters, depending on the sample.

