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# Beltsville Agricultural Research Center



## Introduction

The U.S. Department of Agriculture (USDA), Agricultural Research Service (ARS) Beltsville Area consists of the Beltsville Agricultural Research Center (BARC) in Beltsville, MD, the U.S. National Arboretum in Washington, D.C., and worksites in Chatsworth, NJ, Presque Isle, ME, and McMinnville, TN.

BARC is the largest and most diversified agricultural research complex in the world and is one of over 100 research locations that make up ARS. USDA's chief scientific research agency, 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 the natural resource base and the environment; and
- Provide economic opportunities for rural citizens, communities, and society as a whole.

BARC's record of accomplishments has made it a world leader in agricultural research. Its international reputation attracts thousands of visitors each year from within the United States and abroad. The following sections provide some examples of BARC research addressing ARS priority issues.



# Global Food Security



BARC researchers recognize that animal well-being is closely affected by parasites that cause reductions in weight gain, feed conversion, and overall production efficiencies. Scientists at Beltsville are doing their part to ensure that animal parasites do not endanger national and world food supplies. Currently, BARC researchers are conducting large-scale DNA sequencing studies to identify animal groups that are resistant to many common parasites of livestock and poultry, and they are developing diagnostic tests to help producers identify their parasite problems and assist them in designing management programs to control on-farm infections. Beltsville scientists are also studying the relationship between climate change, host-parasite associations, and changes in transmission patterns. Important findings have emerged regarding the role humans inadvertently play in transporting detrimental parasites around the world.

# Climate Change



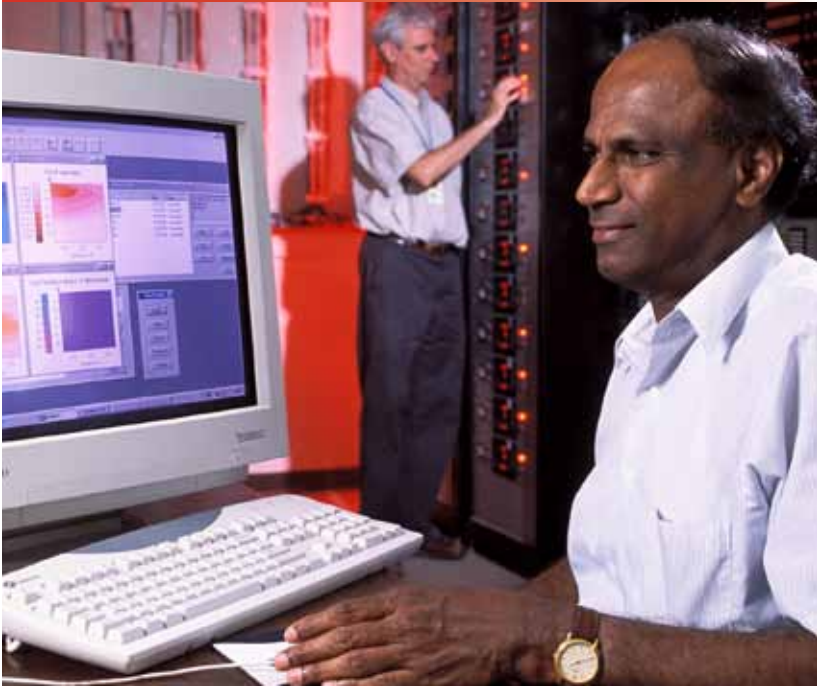
Changes in several environmental factors, such as atmospheric carbon dioxide concentration and tropospheric ozone concentrations, are occurring in addition to the predicted global warming. The projected changes could have many serious consequences for agriculture, and ensuring an abundant, high-quality supply of food and fiber will require adapting crops and crop management strategies to altered environmental conditions. Scientists at BARC carry out research that includes the application of system theories to complex agricultural problems. Work is underway to measure the response and adaptation of crops and weeds to elevated  $\text{CO}_2$  and global warming. Specifically, researchers are examining changes in the expression of genes with exposure to elevated  $\text{CO}_2$  to understand why some crop varieties are negatively affected but not others.

## Child Nutrition and Health



Beltsville children's nutrition/health research focuses on two areas: nutrition monitoring and nutrient requirements/function, which prevent development of chronic disease. Beltsville is responsible for the annual What We Eat in America Survey, part of the National Health and Nutrition Examination Survey, and the USDA National Nutrient Database, which provides updated values for up to 140 nutrients in over 7,500 foods commonly eaten in the United States. The Database supports the determination of dietary intake of children and thus permits research on diet-health relationships. Health benefits of nutrients and active food components from fruits and vegetables are also being studied at Beltsville with emphasis on reducing risk of diabetes and other metabolic diseases. A focus of this research is on disease development and the relationship with age.

# Bioenergy



The growth and long-term viability of bioenergy production in the Nation are impeded by a number of technical and commercial barriers. While new varieties and hybrids of bioenergy feedstocks are being developed, the role of climate change could have a negative impact on crop production. Scientists at BARC have developed computer models that simulate crop (corn and soybeans) responses to climate changes. These models project crop biomass volume and crop yields. The data evaluate crop potential as sustainable biofuel feedstocks and how severe weather may affect biofuel feedstock production.

## Food Safety



As U.S. consumers continue to enhance their diet with fresh fruits and vegetables, it is paramount that these commodities be safe from pathogenic foodborne pathogens. Beltsville scientists study the survival and persistence of pathogenic *E. coli* and *Salmonella* on leafy green commodities, tomatoes, and apples found in irrigation water and soil. BARC researchers are developing technologies and methods to more efficiently and rapidly detect the presence of foodborne pathogens. Systems are being developed to reduce pathogen load on produce through the use of chemical sanitizers, and biological treatments that can target foodborne pathogens are being evaluated. Scientists are working with advanced hyperspectral imaging systems to detect the presence of chemical compounds or bacteria that indicate microbial contamination on produce surfaces and poultry carcasses.



For more information about Beltsville Area research, visit—

[www.ars.usda.gov/ba](http://www.ars.usda.gov/ba)

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