

US Department of Agriculture Agricultural Research Service

Dwayne R. Buxton

The Agricultural Research Service (ARS) is charged with conducting USDA's in-house research. In meeting this mission, ARS generally does not maintain extramural programs unless directed by Congress and, thus, provides little direct funding to researchers outside ARS. Still, ARS collaborates with university, industry, and other scientists and thus often enhances the ability of these groups to conduct research. With a budget of approximately \$800 million and a cadre 2,000 permanent scientists, ARS conducts its research at more than 100 locations throughout the United States and some foreign countries. ARS's research is organized into 23 National Programs with a focus on regional and national priorities or in support of the action and regulatory agencies within USDA. ARS does provide extramural funding for plant explorations and for those activities identified and supported by the various Crop Germplasm Committees.

ARS devotes about \$16 million to support research on new uses, products, and materials. Much of this work is conducted at the four regional research centers in Wyndmoor, PA; Peoria, IL; Albany, CA; and New Orleans, LA. Additional work is conducted at Madison, WI; Hilo, HI; and Winter Haven, FL. Congress in 1938 established the four regional centers to conduct basic and applied research on agricultural commodities to promote better utilization of farm products. This research seeks to transform raw agricultural materials into commercially valuable products such as biodegradable plastics, adhesives, industrial lubricants, cosmetics, insect and weed control agents, and natural rubber from domestic plants.

Kenaf and flax have potential as fiber crops to supply niche markets and needs. Additionally, huge US trade deficits with petroleum imports have characterized the last decade. For transportation purposes alone, \$50 billion of petroleum was imported in 1996. America's dependency on foreign oil (now at 50 percent and rising) is not only an economic issue, but is one of the national security, particularly in times of global unrest. These factors, coupled with environmental concerns regarding the combustion of fossil fuels and production

of atmospheric carbon dioxide, fostered the expansion of the fuel ethanol industry. The capacity of the US industry now exceeds 1.5 billion gallons per year. ARS devotes about \$5 million to support research on alternate fiber and energy crops at the four regional laboratories and at Athens, GA, and Stoneville and Mississippi State, MS.

ARS dedicates about \$2 million to develop products from novel crops at Oxford, MS; Stoneville, MS; Wyndmoor, PA; Peoria, IL; and Albany, CA. The Oxford laboratory is new, and its mission is to discover natural products for use in agricultural pest management, with emphasis on pest management agents derived from plants. Discovery efforts are focused on products for agricultural sectors that are of little interest to the agrichemical industry, such as some horticultural crops and aquaculture. A secondary mission is to support development of medicinal plants as alternative crops.

ARS commits about \$2 millions to support research on industrial crops. This includes research on guayule at Albany, Phoenix, and Oxford; crambe at Peoria; cuphea at Peoria and Ames, IA; safflower at Sidney, MT; flax at Athens, GA; and meadowfoam at Peoria. The mission of the New Crops Research Unit at Peoria is to develop new industrial products from meadowfoam, lesquerella, jojoba, crambe, milkweed, cuphea, *Euphorbia lagascae*, vernonia, or other potential new crops; to solve seed processing problems; and to evaluate germplasm and breeding lines for the proposed crops in collaborative programs with plant scientists. At Phoenix, the New Crops research program seeks to develop agricultural diversification in semiarid and arid regions through the commercialization of new crops adapted to low water requirements. The focus is on guayule, lesquerella, and vernonia. Basic and applied research is conducted to improve available germplasm through selection and breeding techniques. In addition, appropriate cultural management practices are being developed for the eventual economical commercialization of the new crops. Research at Albany, CA is centered on genetically engineering guayule with rubber biosynthesis genes to obtain enhanced yields of high quality rubber and reduce or eliminate the requirement for cold induction of rubber biosynthesis in this species. Additionally, work is being conducted to develop transformation protocols for temperate-zone, rubber-producing annual plants such as milkweed, maize, cotton, soybean, rice, and tobacco.

ARS also conducts research on fruit and nut crops and on floral and nursery crops. A major emphasis is on improved variety development. Complementary programs are conducted in plant pathology and entomology. This includes research on tree fruits at Byron, GA; Kearneysville, WV; Geneva, NY; East Lansing, MI; Yakima, WA; Wenatchee, WA; Corvallis, OR; and Fresno, CA. Research on small fruits is carried out at Fresno, CA; Corvallis, OR; Davis, CA; Poplarville, MS; Orlando/Ft. Pierce, FL; and Beltsville, MD. Research on nuts is conducted at Byron, GA; Davis, CA; and College Station, TX. Research on floral and nursery crops is ongoing at Beltsville, MD; Washington, DC; and McMinnville, TN.

More specific information about ARS research programs at these and other locations can be obtained through the Internet by logging onto ARS's Homepage at <http://www.ars.usda.gov>. Links to homepages at specific ARS locations can be obtained from this source.