

**U.S. Department of Energy
Energy Efficiency and Renewable Energy
Office of the Biomass Program
And
U.S. Department of Agriculture**

**RESEARCH AND DEVELOPMENT ACTIVITIES
BY
ROADMAP CATEGORY**

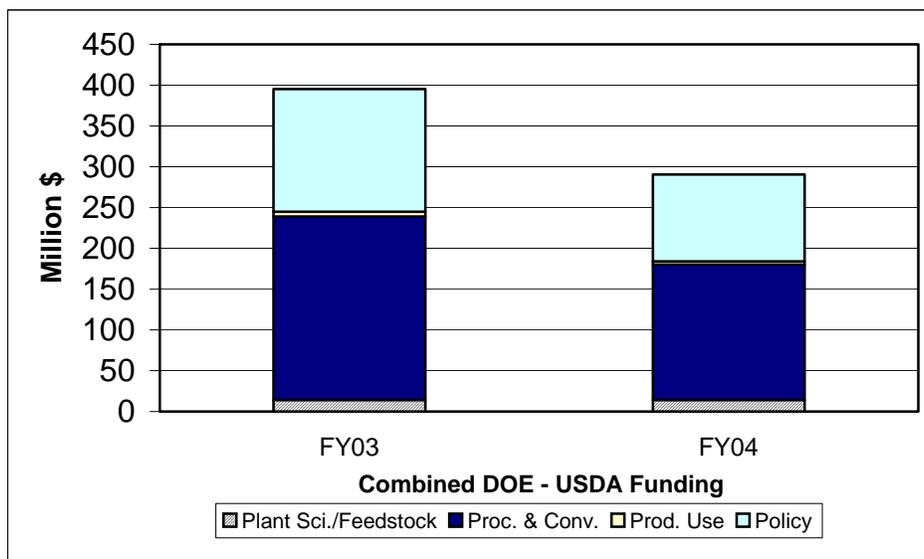
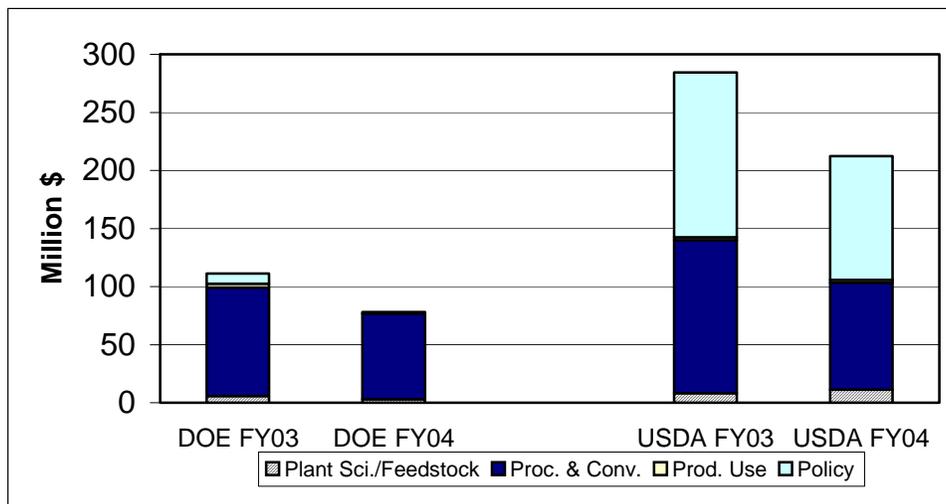
Prepared for:

**Biomass Technical Advisory Committee
and the
Interagency Biomass Research and Development Board**

**Updated:
April 18, 2003**

DOE and USDA Funding by Roadmap Category

Roadmap Category	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Plant Sciences and Feedstock Production	\$5,803,206	\$8,363,000	\$14,166,206	\$3,000,000	\$11,224,000	\$14,224,000
Processing and Conversion	\$93,359,369	\$131,779,000	\$225,138,369	\$73,658,000	\$92,200,000	\$165,858,000
Product Uses and Distribution	\$3,487,000	\$2,288,000	\$5,775,000	\$1,500,000	\$2,369,000	\$3,869,000
Public Policy Measures to Support Biomass Development ^{1,2}	\$8,479,691	\$141,981,800	\$150,461,491	\$0	\$106,511,700	\$106,511,700
Other ³	\$20,638,336	\$500,000	\$21,138,336	\$0	\$500,000	\$500,000
Total	\$131,767,602	\$284,911,800	\$416,679,402	\$78,158,000	\$212,804,700	\$290,962,700



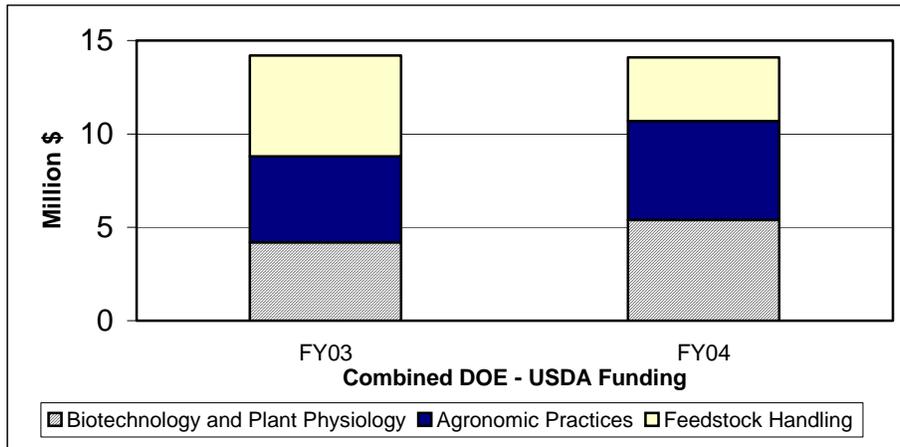
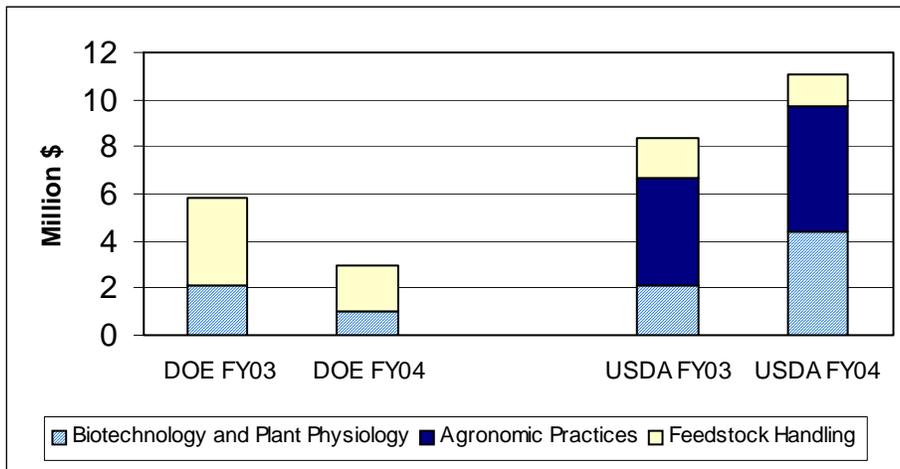
¹ Includes DOE Planning and Analysis Activities and State and Regional Funding

² Includes USDA Rural Development Undistributed Subcategory moved from Processing and Conversion

³ Includes Earmark and Solicitation Reserves

Funding in Plant Sciences and Feedstock Production Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Biotechnology and Plant Physiology	\$2,107,799	\$2,078,000	\$4,185,799	\$1,000,000	\$4,446,000	\$5,446,000
Agronomic Practices	\$0	\$4,596,000	\$4,596,000	\$0	\$5,346,000	\$5,346,000
Feedstock Handling	\$3,695,407	\$1,689,000	\$5,384,407	\$2,000,000	\$1,432,000	\$3,432,000
Total	\$5,803,206	\$8,363,000	\$14,166,206	\$3,000,000	\$11,224,000	\$14,224,000



KEY RESEARCH PROJECTS/FOCUS AREAS IN PLANT SCIENCES AND FEEDSTOCK PRODUCTION ROADMAP CATEGORY

DOE - Biotechnology and Plant Physiology

Enhancement of Bio-Based Products from Sorghum Grain, with Optimized Production, B-8

USDA - Biotechnology and Plant Physiology

Improve Biomass Yield and Quality, A-4

Improvement of Technical Understanding Biochemistry and Development of Biological Pathways and Genomic Data of Woody Biomass, A-23

USDA - Agronomic Practices

Develop Management Practices, Systems, and Sustainable Systems for Energy Crops and Identify New Energy Crops, A-5

Expanding Canola Production in Five Regions across the U.S. and for Trees as Energy Crops, A-18

Optimizes Silvicultural Practices and looks at Ecological Management Practices and Impacts for Woody Crops, A-23

DOE - Feedstock Handling

Agricultural Engineering Systems and Sustainability, B-10

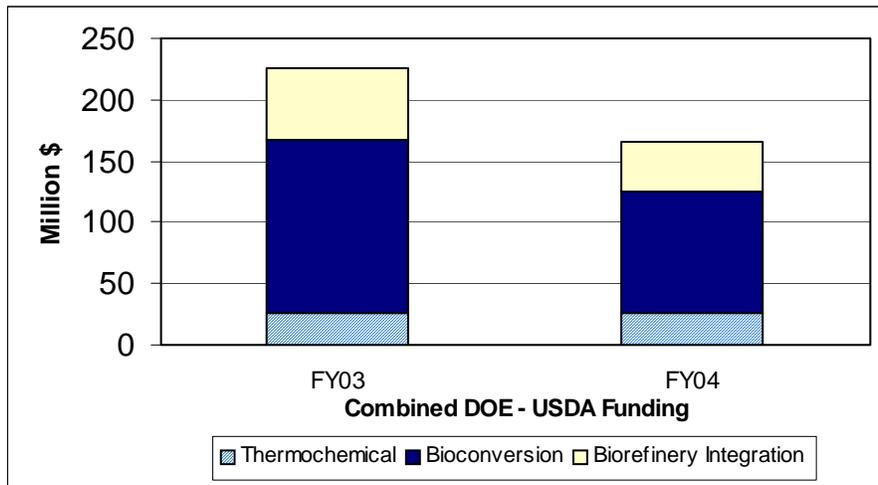
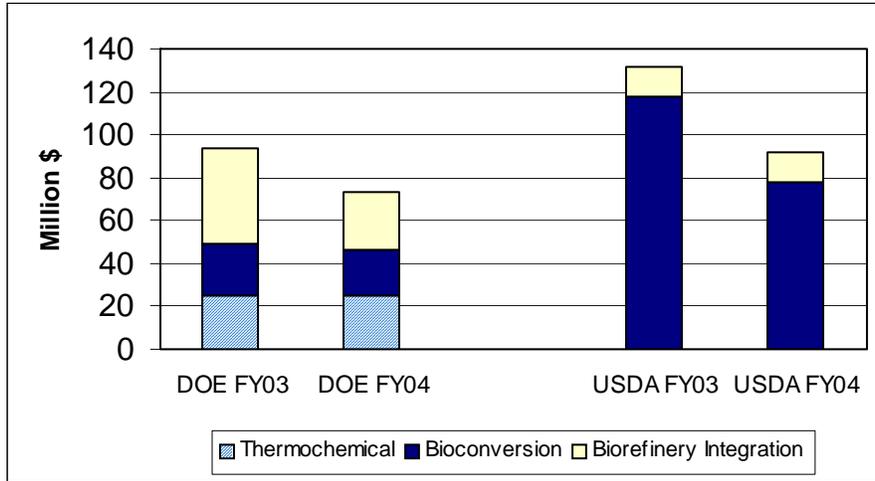
USDA - Feedstock Handling

Develop Herbaceous Biomass Harvesting and Handling Systems, A-6

Explore Feedstock Handling of Woody Crop Systems, A-24

Funding in Processing and Conversion Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Thermochemical Conversion Pathways	\$25,338,425	\$200,000	\$25,538,425	\$25,304,000	\$200,000	\$25,504,000
Bioconversion	\$23,529,294	\$117,670,000	\$141,199,294	\$21,104,000	\$78,000,000	\$99,104,000
Biorefinery Integration	\$44,491,650	\$13,909,000	\$58,400,650	\$27,250,000	\$14,000,000	\$41,250,000
Total	\$93,359,369	\$131,779,000	\$225,138,369	\$73,658,000	\$92,200,000	\$165,858,000



KEY RESEARCH PROJECTS/FOCUS AREAS IN PROCESSING AND CONVERSION ROADMAP CATEGORY

DOE - Thermochemical Conversion Pathways

Demonstration of Black Liquor Gasification at Big Island, B-16
Gasification Program Technology Support and Project Management, B-18
SynGas Platform Advanced Biomass R&D: Syngas Production, B-19
R&D Activities at PNNL, Including Technical Support, Wet Gasification, and Liquid Fuels Gasification and Pyrolysis, B-20
Capital Equipment, B-22
Biomass Gasification Facility in Birmingham, AL (Earmark), B-22
Analytical Studies and Program Integration at NREL Related to Syngas Platform, B-23
High Pressure Combinational Catalysis Unit, B-23

USDA - Thermochemical Conversion Pathways

Explores Environmental and Economic Benefits of Woody Biomass Gasification, A-24

DOE - Bioconversion

Sugar Platform Integration, B-26
Sugar Platform Advanced Biomass R&D Products from Sugars: Fermentation Platform, B-27
Sugar Platform Advanced Biomass R&D: Cellulase Enzymes, B-28
Sugar Platform Advanced Biomass R&D: Pretreatment, B-29
PHAs in Plants (Biomass Biorefinery for Production of Polymers and Fuel), B-30

USDA - Bioconversion

Improve Conversion of Feedstocks into Biofuels and Bioproducts, A-9
Non-Food Characterization/Process/Product Research and Improved Utilization of Wood and Wood Fiber, A-15
Develop More Effective Bioconversion of Woody Biomass, A-24
Value-Added Agricultural Product Market Development Grant Program, A-34

DOE - Biorefinery Integration

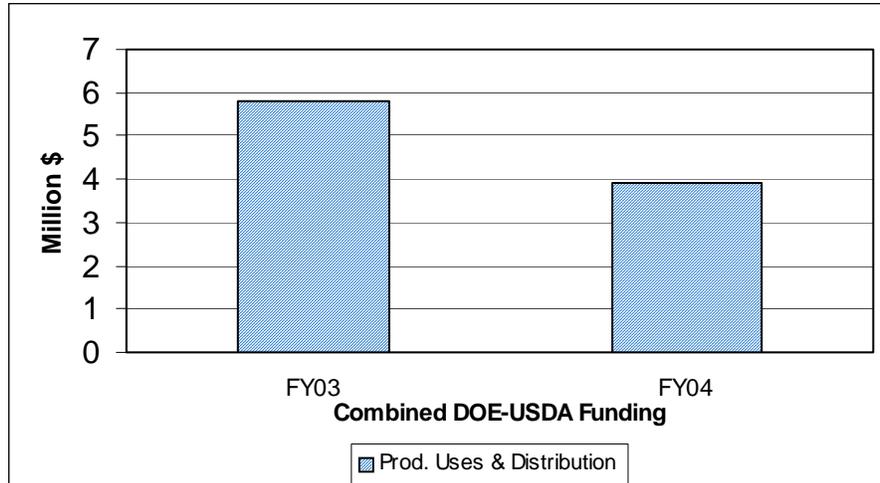
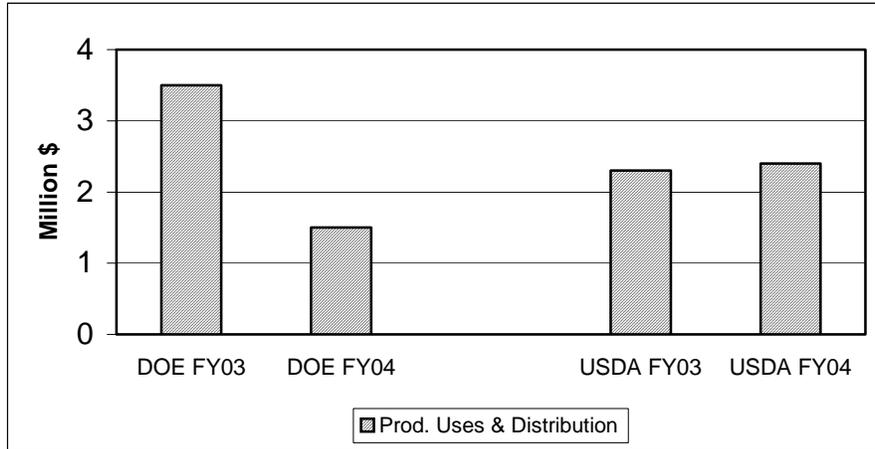
Collaboration with USFS Forests Products Laboratory on Gasifier Demonstration, B-31
GovWorks/Department of the Interior (Obligated to the Six Projects), B-32
A Second Generation Dry Mill Biorefinery*, B-32
A New Biorefinery Platform Intermediate*, B-32
Making Industrial Bio-Refining Happen*, B-33
Integrated Corn-Based Bio Refinery (ICBR) Project*, B-33
Advanced Biorefining of Distiller's Grain and Corn Stover Blends: Pre-Commercialization of a Biomass-Derived Process Technology*, B-34
Separation of Corn Fiber and Conversion to Fuels and Chemicals, Phase II: Pilot-scale Operation*, B-34
Mixed Waste Biorefinery Using Thermal Depolymerization in Colorado (Earmark), B-35
Combined Heat and Power Green Institution in Minnesota (Earmark), B-35
Iowa Switchgrass at Agreed to Levels, B-36
Iroquois Bioenergy Cooperative (Earmark), -37
Michigan Biotech Institute (Earmark), B-37
Mississippi Ethanol (Earmark), B-37
New FY03 Solicitation with USDA, -38
*Funding data for the integrated biorefinery projects is the sum of FY02 and FY03

USDA - Biorefinery Integration

Biorefinery Solicitation with DOE, A-27

Funding in Product Uses and Distribution Category

Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
End-Products and Distribution Systems	\$3,487,000	\$2,228,000	\$5,775,000	\$1,500,000	\$2,369,000	\$3,869,000
Total	\$3,487,000	\$2,228,000	\$5,775,000	\$1,500,000	\$2,369,000	\$3,869,000



KEY RESEARCH PROJECTS/FOCUS AREAS IN PRODUCT USES AND DISTRIBUTION ROADMAP CATEGORY

DOE - End-Products and Distribution Systems

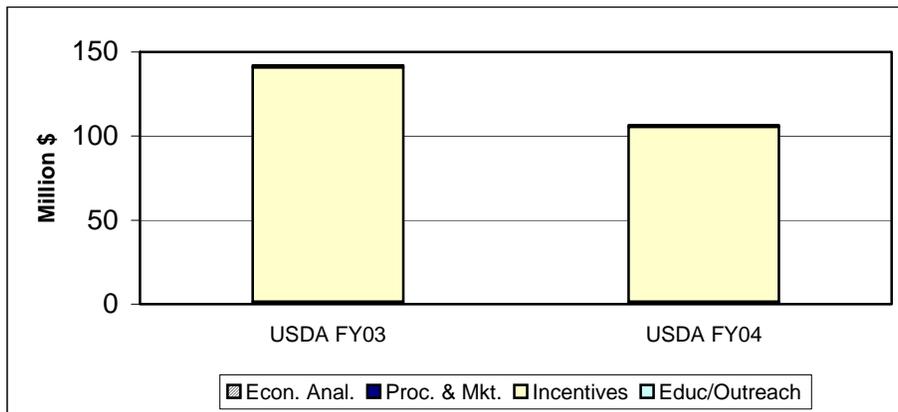
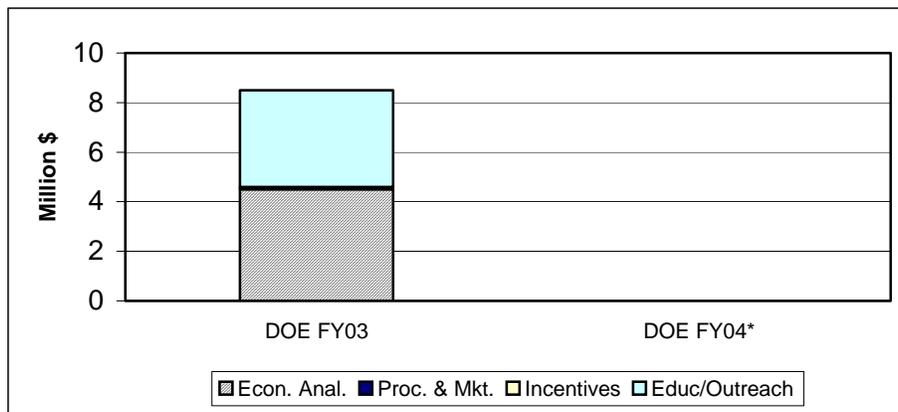
Renewable Diesel: Industrial Oils Platform Analysis, B-39

USDA - End-Products and Distribution Systems

Establish Methods for Characterizing and Measuring Quality of Biomass for Conversion to Biofuel, A-7
Examine Development of High Valued Products from Woody Biomass Feedstocks, A-24

Funding in Public Policy Measures to Support Biomass Development⁴

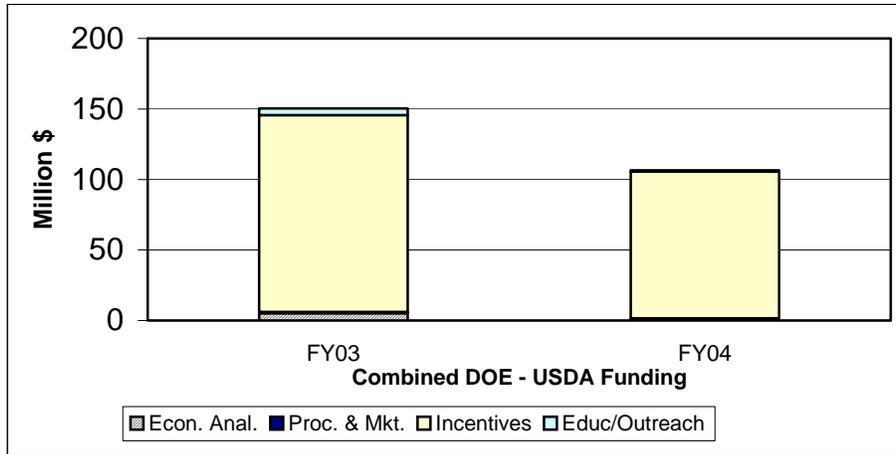
Roadmap Subcategory	FY03			FY04		
	DOE	USDA	Total	DOE	USDA	Total
Economic Analysis ⁵	\$4,514,691	\$630,000	\$5,144,691	\$0	\$634,000	\$634,000
Life Cycle Assessment	\$0	\$0	\$0	\$0	\$0	\$0
Procurement and Markets	\$100,000	\$1,000,000	\$1,100,000	\$0	\$1,000,000	\$1,000,000
Regulatory Measures	\$0	\$0	\$0	\$0	\$0	\$0
Incentives ⁶	\$0	\$139,351,800	\$139,351,800	\$0	\$103,877,700	\$103,877,700
Biomass Resource Supply	\$0	\$0	\$0	\$0	\$0	\$0
Education and Outreach	\$3,865,000	\$1,000,000	\$4,865,000	\$0	\$1,000,000	\$1,000,000
R&D Investment	\$0	\$0	\$0	\$0	\$0	\$0
Total	\$8,479,691	\$141,981,800	\$150,461,491	\$0	\$106,511,700	\$160,511,700



⁴ DOE does not fund policy development activities. FY03 analysis activities that could be used to support policy were listed in this category.

⁵ Includes DOE Planning and Analysis Activities and State and Regional Funding

⁶ Includes USDA Rural Development Undistributed Subcategory moved from Processing and Conversion



KEY RESEARCH PROJECTS/FOCUS AREAS IN PUBLIC POLICY MEASURES TO SUPPORT BIOMASS DEVELOPMENT

DOE - Economic Analysis

State Technologies Advancement Cooperative (STAC), B-46

USDA - Economic Analysis

Provide Policy and Economic Analysis on Biomass Issues to the Secretary of Agriculture, A-30

USDA - Procurement and Markets

Federal Procurement of Biobased Products, A-31

USDA - Incentives

Commodity Credit Corporation's (CCC) Bioenergy Program, A-20

Rural Business-Cooperative Service (RBS), A-36

DOE - Education and Outreach

Education Initiative, B-44

Consortium for Plant Biotechnology Research Initiative (Earmark), B-44

USDA - Education and Outreach

Biodiesel Fuel Education Program, A-32