Bioeconomy Seminar, University of Guelph
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Robert.Fireovid@ars.usda.gov; 301-504-4774

Research for Biobased Industrial Products at USDA Laboratories

- ~$23 million/yr
- 19 projects

Research for
Industrial Biobased Products
at USDA Laboratories

- Biobased industrial products from food animal processing by-products *(Rafael Garcia)*
- Production and value enhancement of biosurfactants and biopolymers derived from agricultural lipids and coproducts *(Dan Solaiman)*
- Discovery and utilization of bioactive components from new crops and agricultural co-products *(Mark Berhow)*
- Amylose helical inclusion complexes for food and industrial applications *(Fred Felker)*
- Novel technology for renewable resource utilization *(Joe Laszlo)*
- Novel technologies for producing renewable chemicals and polymers from carbohydrates derived from agricultural feedstocks *(Chris Skory)*
- Bio-based lubricants from farm-based raw materials *(Girma Biresaw)*
- Improved utilization of proteinaceous crop co-products and residues *(Gordon Selling)*
- Novel starch-based materials *(Victoria Finkenstadt)*
- Development and utilization of new oilseed crops and products *(Steve Cermak)*

Research for
Industrial Biobased Products
at USDA Laboratories

- Functionalization of vegetable oils for use in the polymer, oleochemical, and lubricant industries *(Ken Doll)*
- Modification of natural polymers by novel processes *(Atanu Biswas)*
- Viscoelastic properties and polymer composite applications of nano-materials derived from agricultural byproducts and feedstocks *(Lei Jong)*
- Improvement and utilization of natural rubber- and castor oil-producing industrial crops *(Colleen McMahan)*
- Bioproducts from agricultural feedstocks *(Greg Glenn)*
- Discovery and development of natural product-based weed management methods *(Stephen Duke)*
- Engineering enzymatic redirection of natural crop oil production to industrial oil production *(Jay Shockey)*
- Novel microbial sensing and elimination technologies for protection of agricultural commodities *(Tony De Lucca)*
- Enhanced utilization of carbohydrates and polysaccharides from citrus processing waste streams *(Bill Widmer)*

Research for
Industrial Biobased Products
at USDA Laboratories

Improvement and utilization of natural rubber- and castor oil-producing industrial crops *(Colleen McMahan)*

- Guayule
  - investigated ESTs associated with rubber production
  - developed method for in-vitro tissue culture
  - conducted LCA for guayule-based automotive tires
  - characterized blends of of guayule-Havea rubbers
  - $6.8 million (5-year) grant for developing guayule-based tire
- Russian dandelion
  - phenotypic characterization of different varieties

Research for
Industrial Biobased Products
at USDA Laboratories

Enhancing profitability & sustainability upland cotton, cottonseed, & cotton byproducts through improvemnts in harvesting, ginning, & mechanical processins *(Greg Holt)*

- Biodegradable composites from gin trash, mushroom mycelia and various sources of cellulosic biomass (e.g., flax, kenaf, switchgrass, wheat straw, etc.)
- Thermoplastic composites from cotton gin trash and waste plastic wrap from cottonseed modules
- Biodegradable protective packaging from cotton gin trash
- Converting cotton gin trash into hydromulch

Research for
Industrial Biobased Products
at USDA Laboratories

Functionalization of vegetable oils for use in the polymer, oleochemical, and lubricant industries *(Ken Doll)*

- Rapidly-biodegradable and inexpensive chewing gum
- Anti-wear additives for biobased lubricants

Novel technology for renewable resource utilization
(Joe Laszlo)

- Microbial polysaccharide to replace gum Arabic

Research for
Industrial Biobased Products
at USDA Laboratories

Modification of natural polymers by novel processes *(Atanu Biswas)*

- Biobased nanoparticles for wetting surfaces

Biobased industrial products from food animal processing by-products *(Rafael Garcia)*

- Flocculent from poultry blood

Development and utilization of new oilseed crops and products *(Steve Cermak)*

- Estolide-based lubricants

Research for
Industrial Biobased Products
at USDA Laboratories

Novel technologies for producing renewable chemicals and polymers from carbohydrates derived from agricultural feedstocks *(Chris Skory)*

- Novel sugar-based chemicals from processing wastes
- Livestock prebiotic from wood waste

Production and value enhancement of biosurfactants and biopolymers derived from agricultural lipids and coproducts *(Dan Solaiman)*

- Microbial-based surfactants

Research for
Industrial Biobased Products
at USDA Laboratories

New bioactive and biobased products from plant cell wall polysaccharides in sugar beet pulp, citrus peel and other processing residues *(Lin Shu Liu)*

- Low-cost, biodedradable active (anti-microbial) packaging

Amylose helical inclusion complexes for food and industrial applications *(Fred Felker)*

- Starch-based non-sticky skin lotions

Discovery and utilization of bioactive components from new crops and agricultural co-products *(Mark Berhow)*

- Camelina meal for livestock feed

Research for
Industrial Biobased Products
at USDA Laboratories

Bioproducts from agricultural feedstocks *(Greg Glenn)*

- Novel blow-spinning process for nano-fibers
- Biodegradeable fire-retardant gels to protect buildings
- Biobased matrix for encapsulating organic fertilizers
- Low-cost, biodegradable nanocomposites
- Biobased microbeads for protecting beehives

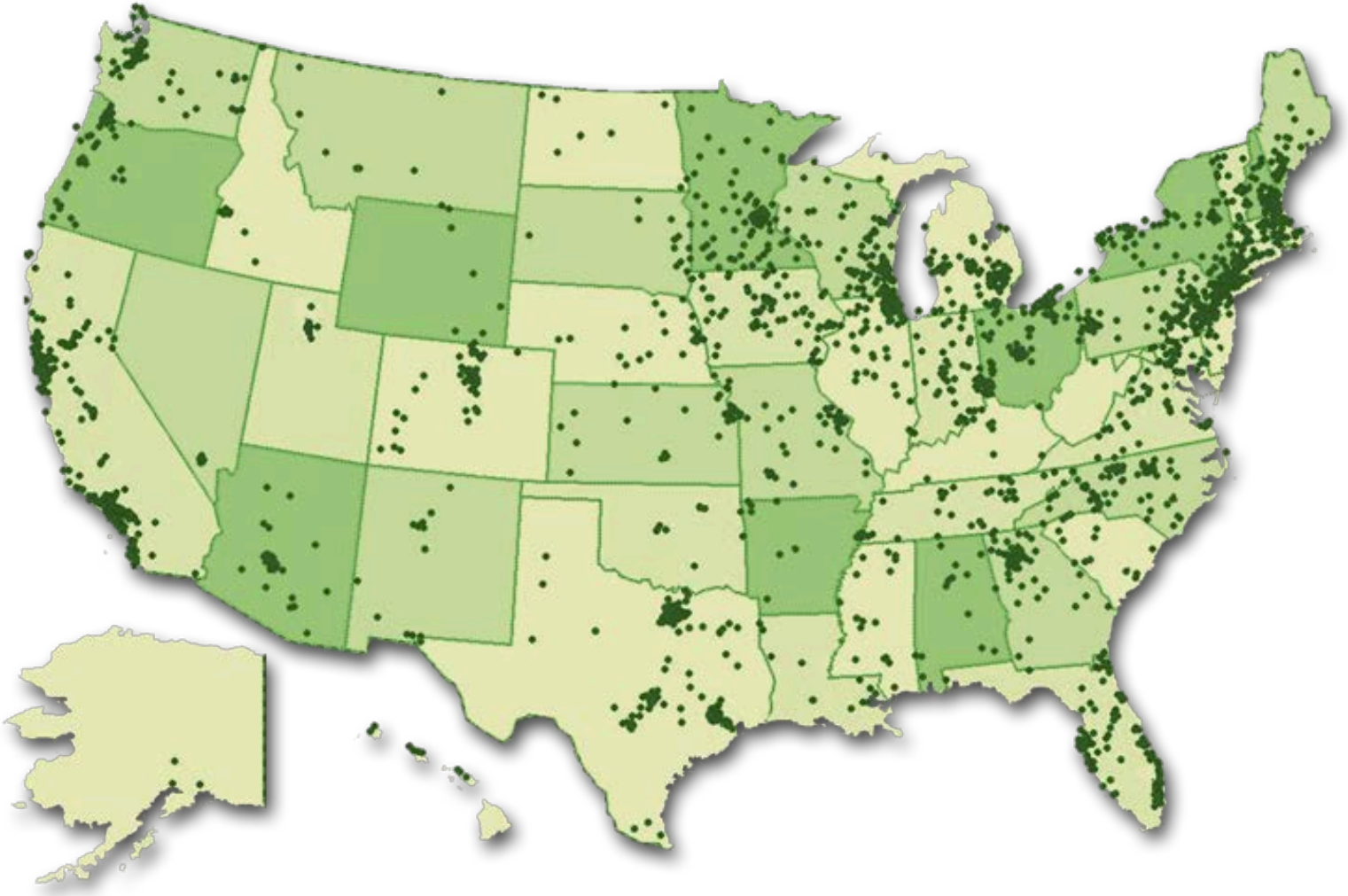
Improved utilization of proteinaceous crop co-products and residues *(Gordon Selling)*

- Plywood adhesives from grains and oilseeds
- Low-cost, biodegradable glycerol-citrate polymers
- Starch-PLA blends for packaging and hygiene products

The USDA BioPreferred® Program

- Established by the 2002 Farm Bill
- Identifies and seeks to establish new markets for biobased products
- Two major program elements:
  - Federal Procurement Preference
  - Voluntary Labeling Program

Businesses with biobased products registered with USDA BioPreferred® program



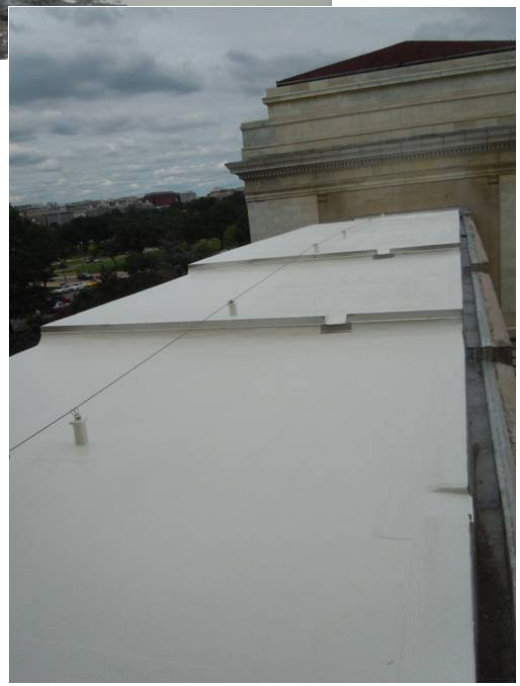
Federal Procurement Preference

- USDA selects and prioritizes categories of biobased products for identification as "preferred" products for Federal purchasing.

- Federal agencies and their contractors must give preference to "BioPreferred" products when making purchases

The Federal Procurement Preference

- Currently, 89 product categories
  - Operations and Maintenance
  - Construction
  - Janitorial and Cleaning
  - Vehicle Maintenance
  - Food Service
- Presidential memo mandates a 50% increase in product categories by next February



Operations and Maintenance

Product Category	Minimum Biobased Content
Forming Lubricants	68%
Straight Oils	66%
Multi-Purpose Lubricants	88%
Parts Wash Solution	65%
Turbine Drip Oils	87%
Graffiti and Grease Removers	34%
Corrosion Preventatives	53%

Construction

Product Category	Minimum Biobased Content
Acoustical Composite Panels	37%
Roof Coatings	20%
Carpets	7%
Membrane Concrete Sealer	11%
Structural Wall Panels	94%
Insulation Foam	7%

Fleet

Product Category	Minimum Biobased Content
2 Cycle Engine Oils	34%
Cable and Chain Lubricants	77%
Diesel Fuel Additives	90%
Multipurpose Greases	72%
Sorbents	89%
Dust Suppressants	85%
General Purpose Deicers	93%

Food Service

Product Category	Minimum Biobased Content
Disposable Containers	72%
Disposable Tableware	72%
Food Cleaners	53%
Dishwashing Products	58%
Oven and Grill Cleaners	66%

Cleaning

Product Category	Minimum Biobased Content
Hand Cleaners & Sanitizers	73%
Glass Cleaners	49%
Floor Cleaners and Protectors	77%
Adhesive and Mastic Removers	58%
Floor Strippers	78%
Multipurpose cleaners	56%

USDA voluntary labeling program

- Drive consumer and commercial markets for biobased
- Help consumer understand “biobased product”
- Aid buyer in locating products
- Assures consumers of biobased content percentages

How Certification and Labeling Program Works

- Independent third party, ASTM International, verifies biobased content through approved laboratories

- "USDA Certified Biobased Product" label affixed to qualifying products.