A SUSTAINABLE TEXTILE INDUSTRY

In the United States, consumers spend more than $600 billion each year on textiles and other materials made from natural or artificial fibers. Textiles serve many important uses, but producing them consumes a lot of water, energy, and chemicals and creates major waste and pollution.

Researchers at land-grant universities across the U.S. are working to make the textile industry more sustainable. Researchers are finding ways to conserve energy and water during textile production, developing new technologies to treat textile wastewater, and creating bio-based textiles from agricultural byproducts.

Sustainable methods and novel technologies will not only help conserve resources and reduce pollution, but will also lower the cost of textile production and give a competitive edge to the U.S. textile industry. The development of bio-based fibrous materials will add value to agricultural byproducts, reduce waste, and increase income for farmers. Furthermore, new value-added products could create new jobs and establish small businesses, boosting local economies. Finding bio-based alternatives to synthetic, petroleum-based textiles will reduce reliance on fossil fuels.

Nebraska researchers produced natural dyes from crop residues.

Georgia researchers used agricultural residues to develop nanocomposite gels for binding dyes to textiles. With long-lasting potency, this dyeing process uses less water, requires only one rinse, and allows unlimited recycling of the dyeing solution.

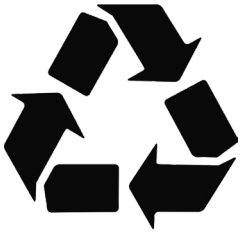
Researchers produced natural fiber composites for vehicle interiors that make vehicles easier to recycle and increase fuel efficiency by reducing vehicle weight.

New York researchers used biodegradable resin and newspapers to develop corrugated composites that can be used in durable, compostable shipping boxes and other products.

New York scientists made composites from natural fibers, such as jute, which are strong enough to use instead of plywood or particleboard.

Researchers in Tennessee, Washington, New York, Wisconsin, and Montana developed bio-based fiber mulches, landscape fabrics, row covers, and insect control meshes that are biodegradable and decrease chemical use.

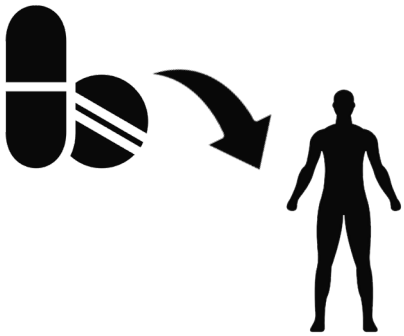
Nebraska scientists reused waste carpets to create composites with excellent mechanical and acoustical properties.



Texas researchers produced biodegradable polyester resin from recycled paper and plastics, reducing waste and protecting the environment.

California researchers created cellulose nanofibers coated with silver nanoparticles that have excellent dispersing, coagulating, and antimicrobial properties as films.

Georgia researchers developed a non-toxic nanoyarn that supports cell growth and could be used in sutures, hernia meshes, wound healing gauzes, and tissue scaffolds.

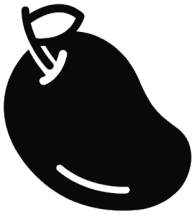


Colorado researchers developed polymer encapsulated nanofibers that can help control drug delivery.

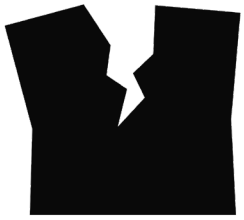
New York scientists are working on tough bio-based fiber composites that could replace the composites (e.g. Kevlar®) currently used for ballistic protection.

New York researchers found that soy protein-based resins have lower flammability than some conventional petroleum-based resins, suggesting they could be used for housing and other structures.

California scientists created bio-based super-absorbent nanocellulose aerogels that can selectively remove oils and other toxicants.



New York researchers created strong resin from inexpensive mango seed starch that is typically discarded.

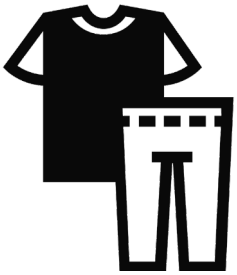


New York scientists developed bio-based resins that are up to 800% tougher and can self heal cracks This means these resins last longer and are useful, economical replacements for conventional petroleum-based plastics and composites.

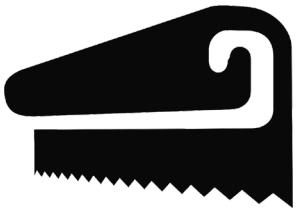
PARTICIPATION & FUNDING

This project, *S1054: Biobased Fibrous Materials and Cleaner Technologies for a Sustainable and Environmentally Responsible Textile Industry (2013-2018)*, is funded in part by the Multistate Research Fund through the USDA-NIFA and by grants to project members at the following institutions: University of California-Davis, Colorado State University, Cornell University, University of Georgia, Iowa State University, Mississippi State University, Montana State University, University of Nebraska, Ohio State University, University of Tennessee, University of Texas-Austin, and University of Wisconsin.

Learn more: *bit.ly/S1054*



Iowa scientists developed cellulose-based textiles that are strong, absorb less water, and are well suited for regular daily wear.



Iowa researchers are growing cellulosic fibers in a mat-like layer that doesn't have to be processed into yarn or formed into fabric and can be used like leather.