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IMPROVING RURAL ECONOMIES THROUGH NEW USES OF AGRICULTURALLY-BASED MATERIALS

ARS research enhances the economic viability and competitiveness of U.S. agriculture by improving the quality and marketability of harvested foods and agricultural feedstocks to meet consumer needs while developing environmentally friendly and efficient processing concepts. The following FY 2020 accomplishments illustrate how ARS researchers achieve this by using agricultural products or byproducts to develop new, innovative, and environmentally friendly products and technologies.

Improved packaging film made from renewable, inexpensive cotton waste materials. Poly (vinyl alcohol) (PVOH) is a plant-derived, water-soluble, and biodegradable compound that holds promise for mitigating the accumulation of nondegradable plastics in landfills and oceans. ARS scientists in Peoria, Illinois, discovered that blending PVOH with cotton processing waste results in a low-cost, biodegradable material suitable for plastics and packaging film. This value-added application of U.S. cotton coproducts benefits U.S. cotton farmers while mitigating plastic pollution.

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Improved antifogging agent derived from wheat, soybean, or milk protein. ARS scientists in Peoria, Illinois, have developed an antifogging agent that outperforms commercial antifog solutions. Antifogging treatment prevents the formation of fog-like droplets on the surface of glass or plastic used for windows, eyeglasses, and goggles. Because the new product is made using proteins derived from wheat, soybean, or milk, farmers and stakeholders in these value chains will benefit from this new use of agriculturally-based materials.

High-value applications of corn stover. ARS scientists in Peoria, Illinois, developed methods to derive nanocellulose from corn stover—the leaves, stalks, and cobs of corn plants left over in a field after harvest. Nanocellulose provides value in many products and end uses, including medical devices, cosmetics, and waste treatment. To enable the production of these products from corn stover-derived nanocellulose, ARS scientists determined the basic flow properties for transferring nanocellulose suspensions. Corn producers and processors will benefit from developing a high-value use from corn stover.

New analytical techniques to characterize silver nanoparticle-treated textiles. Manufacturers add silver nanoparticles to clothing to kill bacteria and fungi and the odors they cause. Safe and reliable nanoparticle-enhanced products require proper analytical techniques that evaluate the resulting technologies and products. ARS researchers in New Orleans, Louisiana, developed two simple, cost-effective, fast, and accurate methods to quantify silver nanoparticles. These methods outperform previously available techniques that are complicated, destructive, expensive, and time consuming.