Pigeonpea—A Summer Legume for Wheat Growers

Pigeonpea may be on its way to becoming a favorite rotation crop for U.S. wheat growers. At least that's what ARS scientists at the Grazinglands Research Laboratory in El Reno, Oklahoma, are investigating.

"We are evaluating performance of pigeonpea as an alternative summer legume crop that can be planted after wheat," says ARS agronomist Srinivas C. Rao. "We are looking for a variety that can grow and mature between the time wheat has been harvested, which is usually June, and replanting that occurs before the first frost in October.

"Pigeonpea varieties mature in 120 to 250 days. So some will fit into this narrow window with just enough time to reach maturity before cold weather hits," Rao says.

Rao brought several different varieties of pigeonpea germplasm from the International Crops Research Institute for the Semi-Arid Tropics in Hyderabad, India. More than 90 percent of the world's pigeonpea crops are grown there.

Several varieties from the institute's germplasm collection show promise. Rao is also looking at Georgia-2, a variety developed by Sharad Phathak, a scientist with the University of Georgia.

Pigeonpea grows well in tropical and subtropical environments, but they can also tolerate drought—an added bonus for Southern Great Plains states that may not get much rain during summer months.

Rao says pigeonpea leaves and stems can provide high-quality forage for grazing livestock at a time when productivity of warm-season forages is declining. This little green vegetable, which looks similar to sweet green peas, contains 17 percent protein.

The Grazinglands Research Laboratory is looking at the crop's nutritive values and their effect on animal performance, but no results are yet available. Another advantage of this promising crop: "Pigeonpea has the potential to protect soil from erosion and degradation, while adding nitrogen to the soil for next year's wheat crop," says Rao.—By **Tara Weaver,** ARS.

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New Process Improves Wheat Flour Separation

Wheat flour can be separated into gluten and starch more efficiently thanks to a new, environmentally friendly process developed by ARS scientists that uses ethanol instead of water.

Each year, about 2 billion tons of wheat flour undergo processing that yields some 300 million pounds of gluten, a crucial protein in the food industry. After gluten removal, the remaining wheat starch can be used as a thickener or in a host of nonfood products, such as cosmetics or cardboard.

Gluten helps bread to rise by trapping the gases produced by yeast. Without added gluten, whole-grain breads would be too heavy to rise adequately. Added gluten also strengthens hot dog buns so they can open without breaking. Pet foods and some breakfast cereals use gluten as an additional protein source and binding agent.

Since 1835, the predominant commercial separation method has required washing the starch away from the gluten with water—up to 30 tons of liquid per ton of recovered gluten. The resultant sticky gluten dough is dried slowly to keep the protein intact.

The wastewater contains fiber, small amounts of starch and protein, and gums called pentosans. "These leftover ingredients can spoil, so the water can't be reused for long," says ARS chemical engineer George H. Robertson. The wastewater must be expensively treated before it can be discharged.

The new technique that Robertson and colleagues invented at the ARS Western Regional Research Center in Albany, California, replaces the water with ethanol.

"Our process takes about half the time of the traditional methods," says Robertson. "Because the gluten breaks into smaller clumps and dries faster, we can use a lower temperature, which protects the protein properties," he says.

Also, virtually all of the ethanol can be directly reused, requiring no discharge. Another plus: Laboratory tests show the protein may be stronger than that derived from water-separated gluten.

In both processes, filters separate the wheat starch from the liquid after the gluten is removed. The new method (patent application no. 08/879,560) is ready for pilot-scale testing and available for licensing.—By **Kathryn Barry Stelljes**, ARS.

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