

## **Breeding Designer Plants**

Tomorrow's amber waves of grain will more likely be a mosaic of highly specialized crops bred for unique applications in manufactured food and industrial products. The Agricultural Research Service is riding the crest of those waves, producing new plants and products that help meet the needs of consumers, growers, and industry.

Finding new applications for plant-based products is a full-time job for ARS scientists who have already come up with novel uses for cornstarch, soybean and sunflower oils, and many other agricultural commodities. Their work has opened new niche markets for farmers, expanded consumer choices at the grocery store, and lessened our dependence on imported goods from abroad.

Traditionally, plant scientists have primarily looked for ways to boost crop yields. This is still a key emphasis in plant development in ARS, but researchers today are taking a much closer look at the genetic makeup of plants, too. The goal now is to breed plants for specific traits that meet the specialized needs of targeted markets.

- Dig a ditch with a backhoe powered by hydraulic fluid from plants? Not only is it possible—a commercial formulation may not be far off. ARS researchers at the National Center for Agricultural Utilization Research at Peoria, Illinois, have synthesized the fatty acid estolides from a blend of soybean, sunflower, and safflower oils to produce a biodegradable base for industrial hydraulic fluid. Caterpillar, Inc., manufacturer of heavy equipment and one of the nation's biggest users of hydraulic fluid, is

testing the prototype formulation at its Peoria headquarters. If it plays in Peoria, plant-based hydraulic fluid could be a hit the world over.

- Scientists at the ARS Range and Pasture Research Station in Woodward, Oklahoma, have transformed corn to reproduce asexually, so seed can be reproduced without cross-pollination. The new corn was developed using a gene from Eastern gamagrass for a trait called apomixis. Apomictic corn could revolutionize agriculture by giving scientists a tool for developing improved plant varieties to retain desired traits. The new corn varieties developed with apomixis display better resistance to cold and insects and are more tolerant of drought and flooding.

- ARS is also improving plants for use in foods, and the proof is in the pudding. Consumers now enjoy a broader range of choices, including more healthful margarine, salad dressing, and dessert products. ARS scientists have bred soybean varieties that produce boosted levels of oleic acids—a plant component shown to lower cholesterol in some humans.

In fact, ARS researchers in cooperation with private industry partners recently rolled out a new class of sunflower called NuSun that produces three times more cholesterol-lowering mid-oleic acid than standard types of sunflowers. Nearly 100,000 acres of the new sunflowers were harvested in 1998 to meet the expanding demand for healthful foods. This boosted farm income and pumped millions of dollars into local economies.

- Need to lose a few pounds? That may be easier now, thanks to a plant-based product called Nu-Trim recently formulated by ARS scientists. Rich in beta-glucans, Nu-Trim is a soluble gum found in oats and barley. It's the latest in a growing family of food additives called

phytonutrients—plant-based products designed to enhance the nutritional quality of foods.

Nu-Trim is a creamy-textured food additive that replaces dairy products and coconut cream in baked goods, salad dressings, and sauces. The Food and Drug Administration recently issued new rules allowing foods containing at least 3 grams of beta glucans per serving to claim health benefits, such as lowering blood cholesterol in a low-fat diet.

- Genetic retooling also means crops have the potential “right stuff” for postharvest processing. ARS scientists at Albany, California, are reprogramming key genes in wheat to improve its milling and mixing quality. The result is a dough for making today's light breads and cookies that require different baking conditions than more traditional fat-laden varieties. That means lower input costs for millers and bakers, while consumers get a better tasting product at a lower price.

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