Three New Crops for the Future

In the year 2020, midwestern farmland may blossom with pink, red, and purple flowers where corn and soybeans used to grow.

The names of the new crops—cuphea, milkweed, and *Euphorbia lagascae*—aren't 20th century household words, but these wild plants may have a future as industrial crops in the next millennium.

"The key to getting these alternative crops into greater use tomorrow is developing products and markets for their oil and fiber today," says Thomas P. Abbott, the leader of new crops research at the National Center for Agricultural Utilization Research in Peoria, Illinois.

Members of the *Cuphea* (koo-FEE-ah) genus produce an oil rich in medium-chain triglycerides, such as lauric and capric acid. Industrial oils made from these acids are valuable to the United States because they can replace others made from imported palm kernel and coconut oil. Lauric acid is used in foods—mostly vegetable shortenings—as a defoaming agent and a booster for soaps and detergents.

Until now, domesticating cuphea has been hindered by problems with seed shattering, stickiness, and dormancy. These problems are being overcome by Oregon State University plant breeder Steven J. Knapp. He has genetically redesigned cuphea, while ARS chemist Bliss S. Phillips is evaluating the new plants for their growing characteristics in the Midwest.

Beyond that, Phillips and other Peoria researchers will be processing cuphea's seed into oil, developing coproducts, and helping midwestern farmers plant the new crop with traditional farm equipment. Knapp's breeding work has been funded, in part, by ARS.

KEITH WELLER (K8680-2)

Chemist Bliss Phillips extracts oil from cuphea seeds to determine oil quality and yield.

"If farmers don't need to purchase new equipment, they'll likely rotate planting cuphea with corn and soybeans every 3 years," says Phillips. Cuphea can help disrupt the life cycle of corn rootworms—pests that account for more pesticide use on U.S. row crops than any other insect. Corn rootworms can cost up to $1 billion a year in control and yield losses.

Milkweed and Euphorbia

ARS and private industry have taken comfort for years in their cooperative efforts to produce milkweed fiber. This fiber has been popular as a filling for comforters and pillows. But another use has been found by ARS chemist Rogers Harry-O'kuru. He and researchers at Washington State University have found that milkweed's leftover seedmeal can be used as an alternative for methyl bromide to control nematodes, the tiny worms that damage potatoes, tomatoes, and peppers.

Another "new" crop that's not yet commercialized is being studied for its potential to grow in the Midwest. *Euphorbia lagascae* gets its name from the Greek word *euphobos*, meaning "well-fed," because of its fat stems. The new crops research team is looking at developing markets for the oil as an ingredient in paints and coatings. At the same time, they are educating midwestern farmers about the potential value of growing these new crops.

At one time, "new crops" were defined as those crops not previously grown in this country. Few people remember that soybeans—now a mainstay of our agricultural system—were once considered a new crop.—By **Linda McGraw,** ARS.

WWII

Mildew and rot-proof fabrics and bandages developed.

Deep vat fermentation developed in Peoria, Illinois, by Andrew Moyer, allowing mass-production of penicillin.

The research to develop coproducts for alternative crops is part of Crop Production, an ARS National Program (#306) described on the World Wide Web at http://www.nps.ars.usda.gov/programs/cppvs.htm.

Thomas P. Abbott, Bliss S. Phillips, and Rogers Harry-O'kuru are in the New Crops Research Unit, National Center for Agricultural Utilization Research, 1815 N. University St., Peoria, IL 61604; phone (309) 681-6533, fax (309) 681-6524, e-mail
[Abbott] abbotttp@mail.ncaur.gov
[Phillips] ncbsp@mail.ncaur.usda.gov
[Harry-O'kuru] harryore@mail.ncaur.usda.gov. ◆

KEITH WELLER (K8681-2)

Cuphea in bloom.

Improving the Weather Odds

When farmers gamble on the weather in the year 2050, they may have advance knowledge of how the climate dice will roll, if weather scientists have any say in the matter.

By then, seasonal forecasting may be possible under certain circumstances, with forecasts issued early enough to influence planting decisions for some crops.

Preparing for that day, ARS atmospheric scientist Steven A. Mauget and soil physicist Dan R. Upchurch are studying climate mechanisms that behave predictably from season to season and are testing whether forecasts based on these mechanisms can truly give farmers an edge.

Through a search of 103 years of climate data, they found significant climate effects due to the El Niño and La Niña phases of the El Niño-Southern Oscillation (ENSO) phenomena, with the strongest effects occurring during the winter in the northern United States. Their work suggests that ENSO-based forecasts may help farmers manage winter crops, such as winter wheat.

What Mauget and Upchurch found tempts them to bet on higher winter wheat yields during El Niño's cool, wet winters and lower yields during La Niña's warm, dry winters. They also believe such forecasts could be valuable in managing other winter crops, such as citrus and winter produce.

Next, the two scientists plan to search ocean temperature and surface pressure records over the past century for clues to 12- and 20-year rainfall cycles observed over the Midwest. If they succeed in pinpointing the source of these cycles and the cycles prove predictable, they believe it might be possible to bet on climate over longer periods and to place those bets further in advance.

Finally, Mauget and Upchurch want to test whether those loaded dice will be a help or a fatal lure. They'll do this using computer simulations of a hypothetical grower's management practices over the course of two parallel farming careers.

During the farmer's first career, she/he will have access to seasonal climate information, but not during the second career. By comparing the difference in net profits between the careers, they hope to estimate the value of such forecasts.

"Seasonal climate predictions are coming, but the question is if, where, and how valuable they will be," says Mauget. "Our role is to see if these predictions actually translate into higher profits, or whether they cause so much risk-taking that profits end up lower."—By **Don Comis,** ARS.

Dan R. Upchurch and Steven A. Mauget are at the USDA-ARS Cropping Systems Research Laboratory, 3810 4th St., Lubbock, TX 79415; phone (806) 749-5560, fax (806) 723-5272, e-mail dupchurch@lbk.ars.usda.gov
smauget@lbk.ars.usda.gov. ◆

Growth regulation ability of 2,4-D (2,4-dichlorophenoxyacetic acid) discovered.

First simple daily nutrition guide published.

Organophosphate pesticides developed.

Methods developed to remove off-taste in soybean oil, including deactivating trace metal contamination and reducing content of rancidity-causing linolenic acid.

Beltsville small white turkey developed, progenitor of today's commercial turkeys.