New Trefoils Give Breeders More Options

Two new lines of narrowleaf and big trefoil plants from the Agricultural Research Service should help breeders develop improved forages for livestock and wildlife.

Trefoil species provide excellent nutrition. Unlike alfalfa, these forages don't cause bloating. They also tolerate marginal production conditions such as dry, saline, or flooded soils. Because trefoils are legumes, they fix nitrogen into the soil for later use by grasses and forbs. This can reduce the need for fertilizer.

The ultimate goal of ARS agronomist Jeffrey J. Steiner and geneticist Paul R. Beuselinck is to increase forage quality on pastureland. That way, farmers won't have to purchase as much feed to supplement the diets of their livestock that graze on pastures.

The popularity of birdsfoot trefoil, a related species, has grown steadily over the past few decades. But growers have only been able to obtain a few commercial varieties of big trefoil, and those were not bred for U.S. farm conditions. No commercial varieties of narrowleaf trefoil are available.

Both of the new releases—ARS-1207 narrowleaf trefoil and ARS-1221 big trefoil—combine the characteristics of dozens of different genetic populations that were collected from around the world. These populations, known as accessions, are stored in the ARS-managed National Plant Germplasm System.

"This seed is intended for breeders, not farmers," says Steiner. "The germplasm enables breeders to evaluate all available characteristics for each species without individually testing each accession." That way, he says, breeders can use the releases to develop varieties adapted to local conditions.

The narrowleaf line descends from 41 different accessions originally collected in about a dozen countries. The big trefoil germplasm incorporates more than 80 accessions from at least 8 countries.

Big trefoil grows in warmer, wetter areas than birdsfoot trefoil. Narrowleaf trefoil prefers drier, warmer areas that may be saline.

Researchers and breeders can obtain small amounts of seed from Steiner.—By **Kathryn Barry Stelljes**, ARS.

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Lab Diets for Two Pest Insects

The Y2K bugs at ARS' Insect Biocontrol Laboratory in Beltsville, Maryland, aren't of the computer kind. Rather, they're two crop-attacking insects: the Colorado potato beetle and the silverleaf whitefly.

Both are the focus of separate, though related, projects of entomologists Dale B. Gelman, Robert A. Bell (now retired), Jing S. Hu, and Michael B. Blackburn. As part of their research, these scientists are creating artificial diets to sustain lab colonies of the insect pests so new weaponry can be more easily tested against them.

Furthest along is work against the beetle, whose larvae cost tomato, potato, and eggplant growers over $150 million annually in losses and insecticide expenses.

The pesticide Admire is a standard defense, but experts fear the beetle may soon develop resistance to it. That's why the Beltsville team is looking for ways to streamline research aimed at finding insecticide replacements—or biological alternatives like parasitic *Edovum puttleri* wasps.

Until now, rearing lab colonies of beetles meant feeding them on a living host, such as potato plants. But growing the plants is expensive and time-consuming.

So Gelman's lab developed a relatively simple artificial diet using oats, lettuce, potato leaf powder, and other ingredients. Dried into powder, lettuce replaces most of the potato leaf material normally required. In addition to cutting costs, "lettuce is easier to obtain because you can buy it at the grocery store," Gelman says.

More importantly, it stimulates most beetles to eat the diet. Gelman's lab has reared nine beetle generations on it so far. After analyzing each generation's average weight, growth, egg production, and other data, the scientists plan to publish their findings.

Indications are "the diet will prove useful for growing beetles in the lab for research purposes," says Gelman. "And you can rear them on it year-round in a cost-effective manner."

Gelman, Hu, and Blackburn are also artificially rearing silverleaf whiteflies to better understand the growth requirements of wasps like *Encarsia formosa* that parasitize the pests.

They hope that by learning to rear the whiteflies, an artificial wasp diet can be created. However, "this project is still in its infancy," Gelman says. "Right now, we're just dissecting the parasites out of the whiteflies and seeing how they develop."—By **Jan Suszkiw,** ARS.

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