Rediscovering Cover Crops and the Power of ‘Green Manure’

Posted by Scott Elliott, Agricultural Research Service in Research and Science

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A cover crop of mustard like the one shown above can be disked into soil as "green manure" to act as a natural fumigant for weeds and diseases. (ARS photo by Peggy Greb)

Farmers throughout history have taken advantage of off-season plant growth to enhance their next year's crops. These plants, called cover crops, are beneficial in many ways, including protection against weed infestation and soil erosion, as well as feed for farm animals. Some farmers use cover crops in no-till farming systems. However, when cover crops are incorporated into the soil, they become a fertility-enhancing mulch – what some call "green manure."

With practice, farmers began growing various plants simultaneously so the strengths of each could help the others. For example, Native Americans grew the "Three Sisters" – corn, beans, and squash. When grown together, corn provided stalks for bean vines to climb and the large leaves of squash plants provided shade to help retain soil moisture and prevent weeds.

Despite the benefits of cover crops, changes in agriculture in the 1950s led to new farming practices, including the use of chemical fertilizers, pesticides, and herbicides. But, in a case of "what is old is new again," cover crops are making a comeback, and Agricultural Research Service (ARS) scientists are finding 21st century ways to improve the old practice.

Jerry Hatfield, supervisory plant physiologist and laboratory director at ARS's National Laboratory for Agriculture and the Environment in Ames, IA said, "The resurgence of cover crops is due to producers discovering the need for diversity in crop rotations, an additional carbon source to feed

microbes to improve their soil, and to reduce erosion." He and his team have observed in fields that the soil increases in organic matter, water availability, and nutrient availability. These changes make the soil more resilient to variations in weather.

Cover crops and the way they are employed vary greatly by region and agricultural specialty. Dairy farmers in Pennsylvania, for example, have used annual ryegrass as a winter cover crop. Now, researchers at ARS's Pasture Systems and Watershed Management Research (PSWMRU) Unit in University Park, PA, are encouraging new cover crops and processes.

"Mixtures of plant species – cover crop 'cocktails' that provide nitrogen fixation and other benefits – and innovative equipment allow farmers to plant the cover crop during the corn-growing season, which leads to vigorous cover crop growth as soon as the corn is harvested," said Curtis Dell, research soil scientist at PSWMRU.

In the Midwest and High Plains, cover crop research also addresses issues beyond maintaining the soil. "Forage production, wildlife and pollinator habitat, salinity mitigation, and nutrient retention are common uses of cover crops in our region," said Mark A. Liebig, research soil scientist at ARS's Northern Great Plains Research Laboratory in Mandan, ND.

With the many benefits that cover crops can offer, this ageless agricultural practice may help today's farmers better prepare for feeding future populations.