In Idaho, New Tillage For a New Crop

Southern Idaho is known for its prodigious yields of potatoes and sugar beets, but the state's growing dairy industry is also supporting the production of a different crop—corn. So David Tarkalson and David Bjorneberg, who work at the ARS Northwest Irrigation and Soils Research Laboratory in Kimberly, Idaho, conducted a 2-year study to see whether farmers who use conventional methods of tillage and fertilizer application could increase corn yields by banding fertilizer with strip tillage instead.

Farmers using strip tillage make just one pass through fields before planting. When they use strip tillage, they remove residue from a 6- to 12-inch-wide strip and till the soil 6 to 8 inches deep with a knifelike shank, which can also inject fertilizer.

Tarkalson and Bjorneberg studied corn yields from one field in 2007 and one in 2009, both of which had been planted with alfalfa the year before. (Research was not conducted in 2008 because a field was not available for study.) In both years, one of the study areas was located at the top of an eroded slope, and the other was located at the bottom of a slope, where soils eroded from higher elevations had accumulated.

The scientists used either conventional tillage or strip tillage and applied nitrogen and phosphorus to the fields either by broadcast application or by subsurface injection with the strip-till shank.

The scientists found that using strip tillage to place fertilizers 6 to 8 inches directly below the seed increased corn grain yields on the nutrient-depleted eroded area by 12 percent in 2007 and 26 percent in 2009, compared to the other fertilizer-placement treatments. This translated into yield increases of 11 to 26 bushels per acre.

Though band placement of nitrogen and phosphorus on higher slopes was especially beneficial to boosting yields, at lower elevations the technique resulted in the same yields as broadcast fertilizer applications. These findings suggest that Pacific Northwest corn growers who apply fertilizer in bands with strip tillage could help lower production costs by reducing tillage while maintaining or increasing yields.—By **Ann Perry,** ARS.

David Tarkalson and David Bjorneberg are with the USDA-ARS Northwest Irrigation and Soils Research Laboratory, 3793 North 3600 East, Kimberly, ID 83341; (208) 423-6503 [Tarkalson], (208) 423-6521 [Bjorneberg], david.tarkalson@ars.usda.gov, dave.bjorneberg@ars.usda.gov.

Good News About Ground Covers for Organic Gardeners

Conventional and organic farmers know that plastic or fabric ground covers can help suppress weeds and retain soil moisture. But using these ground covers as a chemical-free weed control can be complicated for organic farmers who need to till composted manure into their crop fields after planting.

Agricultural Research Service soil scientist Larry Zibilske, who works at the Integrated Farming and Natural Resources Research Unit in Weslaco, Texas, set out to see how these ground covers limit water penetration and affect carbon and nutrient levels in soils. He conducted a soil chamber study using two types of commercial ground covers: One was a needle-punched, double-layer fabric, and the other was a tightly woven material made of flat polypropylene strands. Two types of compost—poultry litter pellets or a compost mix of cattle manure and other organic materials—were used in the research.

Zibilske monitored the movement of nutrients from the two types of composted materials through the two types of ground covers for 30 days. Water was able to pass freely through the fabric cover, but the polypropylene cover limited the movement of water for the first 2 weeks. However, water was able to pass through the polypropylene cover much more easily by the end of the study, perhaps because the cover was becoming coated with organic molecules from the compost.

Levels of beta-glucosidase are sometimes used as a soil quality index to assess how the influx of soluble carbon affects soil microbial activity. Zibilske found that beta-glucosidase levels were essentially the same in soils protected by fabric covers, soils protected by polypropylene covers, and control soil samples without a ground cover. This similarity suggests that these ground covers did not significantly alter or limit biological activities in the soil.

But Zibilske did note links between fabric covers and reduced soil levels of carbon and nutrients. For instance, soil covered by fabric contained only 84 percent of the carbon that the control sample contained, and the soil protected by the polypropylene material contained only 80 percent as much of the carbon as the control sample. Soil samples from the covered columns also had somewhat lower nitrogen and phosphorus levels than the controls.

These results, which were published in 2010 in the *International Journal of Fruit Science,* show that some organic farmers who need to periodically amend their soils with composts after planting can still control weeds—and costs—by using fabric ground covers.—By **Ann Perry,** ARS.

Larry Zibilske is in the USDA-ARS Integrated Farming and Natural Resources Research Unit, 2413 E. Highway 83, Weslaco, TX 78596-8344; (956) 969-4832, larry.zibilske@ars.usda.gov.