New Poultry Litter Applicator Offers Hope for Chesapeake Bay Area

It isn't even fully patented yet, but the Poultry Litter Subsurfer prototype invented by Agricultural Research Service soil scientist Dan Pote is on order by a research coalition across five Chesapeake Bay states: Delaware, Maryland, Virginia, Pennsylvania, and New York.

The coalition, led by ARS's Peter Kleinman and counterparts at Pennsylvania State University at University Park and Virginia Polytechnic Institute and State University at Blacksburg, recently received a $786,000 Chesapeake Stewardship Fund grant to test four prototypes of Pote's Subsurfer in applying poultry litter and composted cattle manure to no-till fields and pastures across the Chesapeake Bay Watershed.

Pote is at the ARS Dale Bumpers Small Farms Research Center in Booneville, Arkansas.

ARS is applying for U.S. and international patents on the equipment. One company has applied for a license to commercialize it.

The Subsurfer can carry up to 5 tons of litter for application below the surface of pastures without damaging the grass, much as a no-till planter places seeds. It can also apply poultry litter below no-till fields before planting.

In prior tests on Arkansas pastures, Pote found that subsurface application of litter lowers nutrient runoff and ammonia emissions at least 90 percent, while increasing forage yields. Kleinman and colleagues at the University of Maryland-Eastern Shore tested several versions of ARS subsurface litter applicators on no-till fields and pastures in Maryland and Pennsylvania, documenting lower phosphorus runoff and ammonia loss and greater corn yields. Jack Meisinger, soil scientist at the ARS Henry A. Wallace Beltsville Agricultural Research Center in Beltsville, Maryland, also reports lower ammonia losses from corn plots.

In 2009, Pote demonstrated the Subsurfer at a Soil Conservation District/USDA Natural Resources Conservation Service meeting in southern Maryland as well as at the 31st Southern Agricultural Systems Conference on Virginia's Eastern Shore.

In spring 2010, Pote teamed up with Karamat Sistani of the ARS Animal Waste Management Research Unit in Bowling Green, Kentucky, to test the Subsurfer on a farmer's corn field near Owensboro, Kentucky. "This is the largest scale test we've done on corn fields," Pote says. "We are comparing the Subsurfer to the traditional method of surface-broadcast application under field-scale conditions."

As a collaborative project, Pote led development of the Subsurfer for pastures and no-till fields, while ARS agricultural engineer Tom Way's team at the ARS National Soil Dynamics Laboratory in Auburn, Alabama, focused on developing a different prototype with adjustable row spacing for litter application in row-crop systems and pastures.

The two machines have such different delivery systems that Pote and Way sought different patents. Pote's Subsurfer uses a unique auger system that crushes litter and distributes it to soil trenches, allowing precise control, including very low rates not previously feasible. His tractor-drawn Subsurfer simultaneously opens eight trenches (2 inches wide and 3 inches deep), each 1 foot apart.

Throughout the southeastern and Middle Atlantic states, poultry production is the primary source of income for many small family farms. Poultry litter is an excellent source of crop nutrients, but the common practice of spreading it on the soil surface promotes odor emissions, exacerbates nutrient runoff to nearby waterways—most notably the Chesapeake Bay, and allows ammonia nitrogen to evaporate. By minimizing nutrient losses, farmers can improve air and water quality and increase crop productivity.—By **Don Comis,** ARS.

STEPHEN AUSMUS (D1510-11)

ARS soil scientist Dan Pote observes as ARS technician Stephen Haller operates their invention, the Poultry Litter Subsurfer—the first commercially viable machine for applying dry poultry litter below ground.