Researchers to determine if aeration reduces compaction, runoff on no-till fields

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Much of Texas' wheat may be grazed as a part of a dual-use crop. But many fields are still prepared using conventional tillage, which may not efficiently capture rainfall - a key to economic success in a semi-arid environment, said a Texas AgriLife Research scientist.

Dr. Paul DeLaune, environmental soil scientist at the Texas AgriLife Research and Extension Center at Vernon, said tillage operations can increase soil compaction, thereby increasing runoff.

Each year, depending on market conditions, up to 75 percent of wheat planted in Texas may be grazed, and of that, 95 percent is under conventional tillage, DeLaune said.

"There is a perception among some producers considering no-till production that using no-till in dual-use wheat production will increase compaction and therefore reduce water infiltration and decrease yields," he said. "Studies are needed to determine whether or not this perception is valid."

One management practice to potentially reduce compaction and/or increase water infiltration is the use of an aerator in no-till dual-use systems, DeLaune said.

The tines of the aerator can be varied from 0 to 10 degrees offset, with soil disturbance increased by increasing the offset, he said. The aerator will disturb the soil down to the depth of 8 inches, yet leave considerable residue on the soil surface.

At the Smith-Walker research field near Vernon, DeLaune studied the impact of different tillage operations in dual-use wheat on runoff quantity, water quality and nutrient loss.

Tillage treatments were applied in early September and included: conventional-till, no-till and no-till with aerator offsets at 0, 2.5, 5, 7.5 and 10 degrees. Although two production systems were to be compared (graze-out and graze plus grain), no livestock grazing took place due to drought and poor forage production. However, there was extensive grazing from whitetail deer, he said.

In mid-December, 1.5- by 2-meter plots were established in the two production systems. Rainfall simulators were used to apply a runoff-producing event to the crop, he said.

A simulated rainfall of about 2.75 inches per hour was showered over the crop and allowed to continue until one-half hour after runoff had started. The runoff water was collected, measured and analyzed for quantity and quality.

In his study, DeLaune timed the minutes it took to achieve runoff. He said the runoff came quickest, in the highest quantity and with the most soil erosion from the conventional-tilled plots.

The total amounts of ammonium and phosphorous in the runoff water were higher also from the conventional-tilled plots.

There was no statistical difference in runoff volume, soil erosion and nutrient runoff amounts between the no-till plots and the aerated treatments, he said.

These initial results show that the use of an AerWay aerator may not be economical, based solely on soil and water conservation. Grazing effects and grain yields may indicate otherwise as the study continues, DeLaune said. Grazing effects and grain yields were not taken due to the extreme and persistent drought in 2008-2009.

Runoff quantity, water quality and yield data will continue to be collected over the next two years.

Source: Texas A&M AgriLife Communications