

Rotation, Cover Crops Impact Cotton Yields More Than Tillage

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CHILLICOTHE – After eight years of research on no-till advantages and disadvantages with cotton crops, Dr. Paul DeLaune is convinced it's not as much about the tillage as it is about the cover crop and/or rotation.

DeLaune, a Texas A&M AgriLife Research environmental soil scientist in Vernon, said he has compared no-till, strip till and conventional till, as well as cotton with a terminated wheat crop in the Rolling Plains.

“What we've seen over eight years is you are really not changing carbon levels,” he said. “But we shouldn't be looking at one thing only. Even though carbon levels aren't changing, we've dramatically changed some soil physical properties.”

With cotton, DeLaune said there's not much residue, so there is little change in infiltration rates between no-till and conventional till cotton.

“But we have seen a greater infiltration rate where we have a terminated wheat crop – doubled or tripled our infiltration rates,” he said.

While the U.S. Department of Agriculture Natural Resources Conservation Service program sometimes requires a multispecies cover crop to qualify for cost share programs, depending on the county, DeLaune said he has been experimenting with both single and mixed cover crops since 20



Hairy vetch cover crop on the Texas A&M AgriLife Research station south of Chillicothe. (Texas A&M AgriLife Communications photo by Kay Ledbetter)

The monocultures he has researched include Austrian winter field pea, hairy vetch, crimson clover and wheat, and the mixed species included rye, wheat, hairy vetch, turnips and radishes. Cover crops are planted at lower than full seeding rates, which may differ from information seen in other parts of the country, he said.

DeLaune said everyone knows cover crops aren't free, as there is cost for the seed and use of soil moisture, but the benefits can potentially outweigh the costs over time.





Austrian Pea cover crop on the Texas A&M AgriLife Research station south of Chillicothe.
(Texas A&M AgriLife Communications photo by Kay Ledbetter)

“We have maintained our cotton yields. We have seen an increase in our soil nitrogen in the upper 6 inches, particularly following legume monospecies. We have seen a visible response to cotton behind those cover crops.”

He said his team measures neutron probes in all of the cover crop research plots every other week and he has compiled four years of moisture graphs.

“Yes cover crops use water,” DeLaune said. “But some people say cover crops make water. What they are talking about is increased infiltration. We pull soil moisture down by timing of cover crop termination in mid to late April, but if we get rains in May and plant in June, we get a much higher infiltration rate and by planting season, we are back to status quo.”

He said he likes to let the wheat form a head and stem before terminating it, adding that may use a little more water, but that’s what makes the residue, which is the key to protecting the soil surface, building root biomass and subsequently infiltration.

The ultimate goal with cover crops is to build soil structure and make it more functional, he said.

“With cotton on cotton, no-till alone is probably not going to cut it,” DeLaune said. “But we’ve done very well with just a wheat cover crop, that’s a \$6 or \$8 treatment per acre compared to the \$20 to \$25 per acre with a mix of some of these species.”

But cover crops alone are not the answer, he said.

“If you are doing continuous cotton, some type of cover crop would be good, but I would encourage a crop rotation,” DeLaune said. “I have data that shows a cotton-sorghum rotation can increase carbon more rapidly, increasing carbon levels in four years under the rotation, whereas we haven’t in eight years with cotton on cotton.”