TEXAS A&M UNIVERSITY
Real Estate Center

To Till or Not to Till

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The value of a piece of land can be thought of as the sum of the value of its properties. Soil health, which plays a major role in land productivity, is an important part of that value equation. Percent organic matter, microbial diversity, and water infiltration rate determine soil health, and each holds an inherent value. However, adoption of "soil health promoting practices" (SHPPs) remains low in Texas.

SHPPs are management tools that follow soil health principles such as keeping the ground covered, reducing disturbances, maintaining plant diversity, keeping living roots in the soil all year, and incorporating animal grazing in cropping systems. SHPPs prevent on-site erosion, flooding, and nutrient and sediment accumulation in adjacent surface water (commonly referred to as "runoff"). They improve water infiltration, which promotes plant-available water and recharge of aquifers.

Places like the Brazos River Watershed have experienced significant sediment loading caused by poor soil health in surrounding areas. Sediment loading negatively affects the storage capacity of flood control reservoirs managed by the Brazos River Authority and the Army Corps of Engineers.

The Takeaway

Farmers are aware of the benefits of soil health. However, the difficulty in quantifying soil health, diminishing availability of land (resulting in higher land prices), the time necessary to improve soil health, and the need to turn a profit often discourage farmers from adopting soil health promoting practices.

Sedimentation, excess nutrients, and pesticides also impact aquatic animal species in rivers and disrupt habitats for endangered species and fish sought by anglers.

Low SHPP Adoption in Texas

According to the United States Department of Agriculture's Economic Research Service, by land area, no-till (growing crops without disturbing the soil by tilling; considered an SHPP) had a 15 percent adoption rate

in Texas in 2017 compared with a 50 percent average adoption rate for the entire United States (looking at use of no-till and strip-till at some point between 2014–17). Uncertainty in the optimal measurements of success for SHPPs and the scarcity of accessible, farmable land discourage the use of SHPPs despite the advantageous soil health outcomes.

Two conversations with row-crop farmers from Central Texas—those who use SHPPs ("adopters") and those who do not ("non-adopters")—provide insights on why they (and the market) do not require the presence of healthy soil when making purchasing and leasing decisions.

Several recurring themes defined a farmer's decision to buy or lease land. Farmers preferred fields close to their current fields and far from residential housing. The land needed to be accessible by quality roads and bridges (narrow dirt roads and bridges likely to flood are avoided). Farmers avoided fields with rocks, high slopes, hills, or odd shapes that required time-consuming and expensive management practices. Terraces prevent erosion and aid in water capture. Local, informal knowledge of the previous owner's or tenant's use of fertilizer, yield, and management practices is also an important factor. Farmers who lease land prefer longer leases to minimize uncertainty. Of course, high lease rates are prohibitive.

While soil health features were mentioned, they were not prioritized. Farmers' uncertainty in quantifying soil health prevents the adoption of SHPPs. Most farmers looked to yield and biomass—output from production—as the primary indicators of soil health. Water management and organic matter were secondary. Yield and biomass are the most tangible and easily quantifiable measures but, alone, can create "false positives." A piece of land's soil health could, in fact, be poor, but yield can be maintained through inputs such as fertilizer, pesticides, and herbicides or by changing to a higher-yielding crop variety. While these improve yield, they do not improve soil health.

The lack of purchase opportunities for land and high land prices impeded demand or implementation of SHPPs when farmers decided to buy or lease farmland. Farmers are not unaware of the benefits of soil health. Rather, they are land hungry because of urban growth and are confident they can improve the soil health.

These themes are consistent across adopters and non-adopters of SHPPs. In the non-adopters group, one farmer stated, "I think as farmers if you're actively farming or aggressively farming . . . you're going to take the land regardless [of how healthy the soil is] and try to do what you can with it." Similarly, someone in the adopters group said, "But to us, as farmers, it doesn't matter what the soil looks like" and "[I] have done it long enough . . . that I could take that piece of ground, and I may bring my strip-till program over here and my no till-program . . . and I can make money with that piece of ground."

Hungry for Land

Both focus groups discussed how urban growth has reduced the amount of land for sale and how land prices have risen. "I mean everybody in here, we're hungry for land. We want more land," said one farmer from the adopters group. Another said, "If [badly eroded land is] cheap enough [I] would buy it, because we're dealing with urban growth."

The same theme emerged for non-adopters. One commented on the large amount of urban pressure, and another agreed, saying, "It's hard to compete and buy land and pay for it with agriculture . . . production." Because

About the Study

Comments in this article came from focus groups conducted with farmers who had adopted SHPP and farmers who had not. Participants, all from Texas' Lower and Middle Brazos River Watershed, were selected by the Texas Natural Resources Conservation Service and Texas A&M AgriLife Extension agents and specialists.

Participants' insights provided a foundation for a survey that will identify links between the adoption of SHPP to biophysical outcomes that farmers perceive as meaningful. The goal of this research is to inform policy makers at organizations like the USDA about Texas soils and explain why some farmers practice conventional tilling while others use strip-till or no-till practices.

Texas row-crop farmers who want to take the survey can go to https://tamuag.az1.qualtrics.com/jfe/form/SV_dh8fueIdKfLD5k1. The survey can be accessed on a phone or computer.

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of urban growth, farmers buy more land when they have the opportunity and financial ability to do so, regardless of the soil health.

These farmers have seen the population in their counties grow 21 percent since 2010. Population in counties such as Williamson and Fort Bend grew more than 33 percent (see map). Texas' population is expected to grow to 47.3 million by 2050, up 88.3 percent from 2010 (see figure).

Soil Health, Time, and Profitability

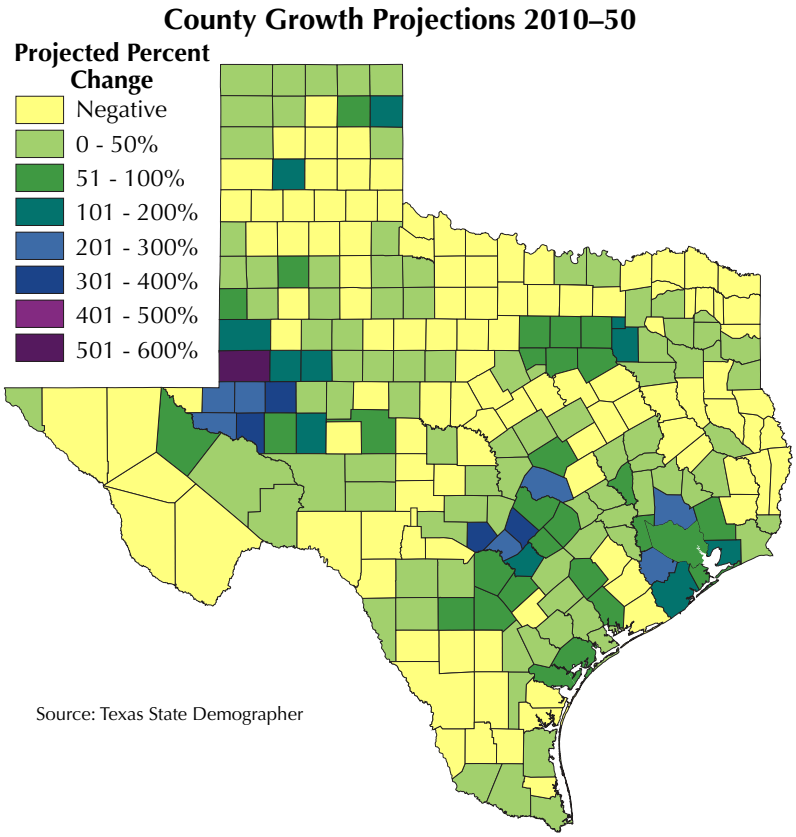
Farmers from both the adopter and non-adopter groups repeatedly stated that improving soil health would take time. Clearly, farmers perceive soil health as a dynamic, though slowly changing, aspect of their fields.

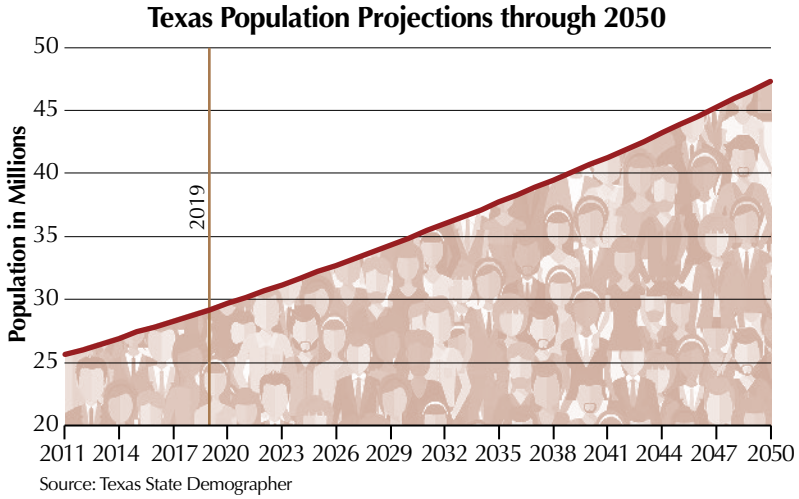
"In the initial phases of this we do [no-till] just to save labor, cut costs, and those types of things," one farmer said. "But a couple of years into it, we start to see . . . yes, you can change the quality of that land in dramatic ways given enough time and patience. But it does not happen in a two- or three-year period."

Because of that, the tenure of holding the land became the next impediment to applying SHPPs. Farmers who lease the majority of their land especially had a disincentive to apply a new soil management practice. Many said the tenure of their lease is uncertain given the high demand for landowners to transition land into residential developments. Farmers fear recouping the cost of a new soil management method if they can't farm the land for at least five years.

"There's no reason for me to lease anything under a three-or-five-year lease and start building soil management," a participant said. "You have [to consider] things like what if the land sells? If the person dies, does that lease go on? If you don't get . . . four-or-five-year leases or longer, we . . . call it raping the fields because you're . . . getting what you can out of that year not knowing whether you've got the next year. We try to look at a long-term effect, and if we can't get a longer lease on it, then it's not worth our time."

Landowners, aware of the increased demand for transitional land, may prefer annual leases. Annual leases prohibit a farmer's ability to take advantage of programs that support and mitigate costs and risks when switching to SHPPs. These programs usually last three to seven years.





Profitability ultimately acted as the "gatekeeper" in making soil management decisions. As one farmer stated, "If you aren't in business . . . then the conservation doesn't matter." Another said, "We're not doing it to save the world . . . that's not the purpose. We're trying to turn red numbers black at the end of the day. That's the number one reason we're here: profitability."

Soil health is intuitively an essential evaluative measure of a property when marketing agricultural land, but it does not drive a farmer's decision to buy or lease land despite his awareness of the importance of soil health. Urban growth reducing the number of available acres and the farmer's confidence in his ability to improve soil health diminish demand for land with superior soil health. Therefore, the market disincentivizes land owners to implement or encourage implementation of SHPPs.

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