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Cooperative Extension Service

Farm Update

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Increasing Yield Down the Drain

Three farm infrastructure investments that never concern Suzy Martin, a Farm Management Specialist with the Ohio Valley Farm Analysis Association, are the installation of irrigation systems, grain storage systems, and soil drainage systems. These three investments are essentially guaranteed to increase farm income over their useful service life and are therefore considered a wise investment for your land. The return on investment of sub-surface systems is evidenced by the thousands of acres of land tiled in our area each year at a cost ranging from $600 to $1,000 per acre. Yet I frequently find myself in conversation with lenders, landowners, municipal service providers, and farmers who either don't fully understand how it works, why it is beneficial, or if the yield change will ever pay for the installation cost.

Most of the Green River Area, Northern Hopkins, and Muhlenberg Counties comprise a geological area known as the Illinois Coal Basin. This area is relatively level to rolling, with deep soil and depth to bedrock. Our soil, combined with average annual precipitation exceeding 50 inches, presents high winter and spring water tables that delay soil drying. This results in uneven soil drying, ultimately reducing yield and increasing production expense.

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Sub-surface drainage is simply perforated plastic pipe ranging from 3” to 8” in diameter buried beneath the soil surface on a continuous grade. Using gravity, excess soil moisture to a depth of three feet below the surface drains to the pipe, providing a path of least resistance out of the soil profile. Only water held in large soil particle pore space is moved by gravity and released. No different than a sponge draining after being removed from a sink. Water retained in small pore spaces remains available for the plants. Like a wet sponge that is no longer dripping.

Roots cannot grow in complete water saturation. In the spring, a poorly drained soil field surface may dry enough to allow planting to occur but as roots go down, they soon meet a bed of water beneath the surface resulting in shallow rooting depth early in the season. Eventually, the water table lowers as the summer growing environment increases but by then there is a large growing crop with shallow rooting depth. This results in decreased production and yield in drier years. The advantage of drainage is that roots can grow deeper earlier in the season due to increased air volume in the soil. When the summer growing season is underway, roots are deeper, providing access to subsoil moisture during drier periods.

Flooding is a problem in most counties near creeks and tributaries. I have heard it said by a local municipal service representative that continuous flowing drain tile before and during heavy rain events contributes to flooding. That is not true. Poorly drained soil types improved by subsurface drainage actually help alleviate flooding, not contribute to it. In the spring, when flooding typically occurs, the water table is high. When oxygen in the large soil pores is continuously displaced by water, the soil cannot hold additional moisture, forcing rainwater to immediately move off the field surface and into rising streams and creeks. Poorly drained soils improved with drainage are continuously draining the large pores during periods of high water

tables, allowing those fields to absorb larger volumes of rainwater, releasing the excess water from the large pore spaces slowly during the days following the rain event.

In reference to up-front cost, tile does provide a positive return on investment through increased yield. Yes, for landowners renting land for cash or crop-share, the return on investment occurs more slowly than those receiving all of the increased yield revenue, but drainage systems benefit beyond the annual rent income. As mentioned, drain tile increases water movement beneath the soil and decreases water movement above the surface, this inherently decreases soil erosion, especially when surface water drains are installed in zones where large volumes of water movement occur. Secondly, the cost of tile has increased, but so has the value of owned land and the cost to purchase additional land. As mentioned above, Suzy's advice is to ensure maximum productivity of land you already possess before adding more acres. The maximum production from the current property is what may make the next land purchase cost affordable.