Precision Conservation Management

TILLAGE

PCM's tillage analysis summarized the results of more than 3600 corn and soybean fields in Illinois from 2015-2018. The most meaningful analysis resulted from parsing the data into higher (SPR>136) and lower (SPR<136) soil productivity levels.

LOWER PRODUCTIVITY SOILS: On lower productivity soils, strip tillage was used to produce the highest corn yields (10 bu/a more than the next-best tillage system) and 1-pass light tillage (e.g. vertical tillage and other "low intensity/low disturbance" tillage tools) narrowly beat out 2-pass moderate tillage as the highest-yielding soybean production tillage system. But there's more to the story than just yields and the highest-yielding systems were not generally the most profitable systems. Strip tillage systems had higher direct costs ($25+ per acre more than other tillage systems) which were not necessarily related to the tillage system itself, making strip tillage on lower productivity soils less competitive from a financial perspective for corn production. Similarly, the 1-pass light tillage system that produced the highest soybean yields also had the highest directs costs, making it less profitable than the 2-pass light tillage system but about the same as no-till for net profitability.

HIGHER PRODUCTIVITY SOILS: Regardless of the crop, PCM data consistently demonstrated that higher productivity soils produced greater profits when strip-tillage or a single tillage pass were used for field preparation rather than when two or more tillage passes were used. For corn, strip tillage and a single light tillage pass were the most profitable tillage systems for highly productive soils (Table X), even if they were not always the highest-yielding systems. Similarly, for soybean grown on higher productivity soils, 1-pass light tillage was the most profitable even though it did not generate the largest average yields.

TAKE-HOME MESSAGE: Reduced tillage systems (1-pass and strip-tillage) are consistently higher yielding systems relative to more (and more intense) tillage passes. However, on lower productivity soils, we find that the other direct costs (e.g. fertilizer, pesticides, seed, drying, storage, and insurance) can sometimes negate the benefit of the higher yields by adding costs that make these conservation systems less profitable. It appears that the higher direct costs are <u>not</u> related to the tillage systems themselves. If you are considering reducing your tillage passes or moving to strip tillage, consider your whole system and see if you can do it without increasing other costs.

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Table X. Economic returns resulting from various tillage practices for corn production in central Illinois from 2015-2018. High soil productivity rating soils (SPR>136).

PCM TILLAGE STANDARD	NO-TILL	STRIP TILL	1-PASS LIGHT	2-PASS LIGHT	2-PASS MODERATE	2+ TILLAGE PASSES
# fields	*160*	*178*	*329*	*139*	*238*	*20*
Yield per acre	*222*	*227*	*223*	*232*	*227*	*212*
Soil Productivity Rating	*142*	*141*	*141*	*142*	*141*	*142*
GROSS REVENUE	**$772**	**$797**	**$781**	**$801**	**$790**	**$735**
TOTAL DIRECT COSTS*	**$377**	**$372**	**$362**	**$381**	**$386**	**$325**
Field Work	$0	$18	$11	$22	$26	$49
Other power costs**	$96	$95	$96	$94	$94	$100
TOTAL POWER COSTS	**$96**	**$113**	**$107**	**$116**	**$120**	**$149**
OVERHEAD COSTS	**$36**	**$36**	**$36**	**$36**	**$36**	**$36**
TOTAL NON-LAND COSTS	**$510**	**$521**	**$505**	**$533**	**$542**	**$510**
OPERATOR & LAND RETURN	**$262**	**$276**	**$276**	**$267**	**$248**	**$224**

*Direct Costs = fertilizers, pesticides, seed, cover crop seed, drying, storage, and crop insurance
**Other power Costs = fall fertilizer application, spraying, planting, cover crop planting, spring/in-season fertilizer application, harvesting, and grain hauling