

# MAX EMERGENCE

Get better wheat populations  
with reduced tillage, flat press wheels—  
even after a rain.

**H**eavy rains that come right after wheat planting can do more harm than good. Ask anybody who has watched wheat plants try to struggle up through sediment-filled furrows or who has seen a field crust over.

Now, research at the USDA's Akron research station shows that reduced tillage combined with flat press wheels on grain drills can help prevent damage from heavy post-planting downpours or from irrigating wheat up with sprinklers.

"Rains occurring right after winter wheat planting can greatly reduce wheat plant emergence. One inch of rain in 30 minutes can potentially reduce emergence by as much as 50%," says Steven Hinkle, a researcher at the Central Great Plains Station.

Grain drills that have hoe furrow openers push or throw aside the dry surface soil to form V-shaped furrows with the winter wheat normally planted 1.5 inches below the bottom of the furrows.

Rain that occurs after winter wheat

planting can reduce emergence because soil from the sides of the furrow slump toward the furrow bottom. The problem can be compounded if the soil forms a surface seal or crust.

Hinkle, an agricultural engineer, studied wheat plant emergence under several tillage treatments during 1987 and 1988. His objective was to measure any changes in winter wheat emergence after 30 minutes of artificial rainfall was applied within four days after planting.

Winter wheat was planted with hoe furrow openers and either V-shaped or three-inch-wide flat press wheels. Land slope on all plots was less than one-half of one percent.

Wheat plant emergence generally decreased in direct relation to increasing rainfall amounts for all tillage and residue levels, Hinkle reports.

His study showed that emergence was not significantly different in plots that were planted with the V-shaped press wheels (all tillages and residues) and with the flat press wheels in dry clean-tilled plots. These plots had the lowest plant populations among all tillage and residue treatments for each rainfall amount.

When winter wheat was planted with the flat press wheels in clean-tilled plots with no residue, emergence levels were similar to the plots planted with the V-shaped press wheels. That's because soil in the clean-tilled plots was so loose that it fell back into the furrows behind the flat press wheels, Hinkle explains. As a result, the three-inch-wide flat press wheels had no effect in changing the furrow shape.

However, using wide, flat press wheels in reduced-tillage conditions with surface residue significantly improved emergence.

The amount of residue is also a fac-

**Wheat emergence after one inch of rain applied after planting to sweep-plowed fields planted with flat press wheel (left), and to clean-tilled fields planted with traditional V-shaped press wheels (right).**

tor in plant emergence. Plots that were sweep-plowed and then disked just before planting had one ton per acre of residue and had less winter wheat emergence compared to plots that were only sweep-plowed and had two tons per acre of residue. No-till plots with almost three tons per acre of residue had the highest level of plant emergence. The no-till plots had reduced wheat populations only when more than 1.5 inches of water were applied in 30 minutes.

Planting with flat press wheels in firm, no-till soil conditions produced furrows with furrow bottoms almost as wide and flat as the press wheels. Those conditions reduced the amount of soil that eroded into the furrow bottoms leaving shallower deposits of soil over the seed row.

In this study, soil texture appeared to have little effect on winter wheat emergence. Plant populations were not significantly different between silt loam and sandy loam soils in plots that were planted with V-shaped press wheels, or in disked or clean-tilled soil.

Reduced tillage and/or increased surface residue appear to be the major factors that affect emergence. If sprinkler irrigation is applied to planted winter wheat to guarantee emergence, then irrigated-wheat farmers should use flat press wheels in combination with reduced tillage and surface residues to minimize emergence problems, says Hinkle. ■

