Thirty-five years of data can’t be wrong.

At the University of Guelph’s long-term crop rotation plots in Ontario, Canada, which have been under observation since 1980, scientists have compared a diversity of crop rotations ranging from continuous corn to continuous alfalfa with each one having a no-till and conventional tillage comparison.

With 35 years of data accumulated, Bill Deen, the agronomist who oversees the university’s long-term plots, says one fact has become clear: Increased crop diversity pays on almost every measure from crop productivity to input use efficiency when compared with simple rotations like corn–soybean.

“The story that is really emerging from this trial is that the corn–soybean rotation, which represents the most common rotation across Ontario and the northern Corn Belt, is associated with the lowest yields and the lowest system resiliency. It’s most vulnerable to moisture extremes—particularly drought conditions. It has the lowest soil organic matter and the lowest input-use efficiency. It has higher nitrogen (N) requirements than a more complex rotation. It’s got a reduced probability of no-till success. And, it has higher greenhouse gas emissions.”

That long list of concerns, Deen argues, can be alleviated simply by adding a third crop like winter wheat or a forage crop like alfalfa to the system. Moving from a two-crop cycle to a three-crop cycle, he says, improves virtually everything.

Wheat and cover crops

The biggest opportunities in productivity come with adding winter wheat, Deen stresses.

“When you add wheat into the system, your corn yield next year goes up. And, if you have two years of corn in the system, your second-year corn yield goes up,” he says. “But more interestingly, the biggest impact is on soybeans three years later. You see about a 14% yield increase in soybeans by including wheat into the rotation.”

The reason for the yield increase, Deen argues, is because the negative effect on soil quality from soybean is reduced as the crop rotation becomes more diverse.

“Our experience is that soybean-intensive rotations tend to have lower soil quality,” Deen says. “I think that’s