The equation for improving water quality

By Matt Reese

In just one short presentation at the **Conservation Tillage and Technology Conference** in Ada, Newell Kitchen provided a great example that illustrates the complexities of the vexing water quality issues in Ohio agriculture.

Kitchen is with the USDA-ARS Cropping Systems and Water Quality Research Unit. Over the last two decades he has worked to address a challenge that has torn down civilizations for thousands of years — soil erosion.

“Civilizations didn’t so much collapse as they consumed themselves,” he said. “How do we get away from treating soils as consumable? When erosion consumes 1.5 inches of topsoil it takes 300 to 400 years to replace that soil if it is under grass. Erosion is still unfortunately a very active process on the agricultural landscape and it needs to be addressed. Sometimes we think a little erosion is not going to matter in the long run, but it does matter.”

To make matters worse, soil erosion also contributes significantly to problems with water quality. So with the clear evils of erosion in mind, Kitchen has closely worked with a crop field in Missouri to reverse the trend of soil loss in crop production since 1993.

“We found that there had been a tremendous amount of soil loss in that field — as much as 14 inches. That topsoil has value,” he said. “We decided we had to go to no-till and cover crops. We planted a wheat and corn rotation in the north part of the field where topsoil loss was the worst and we planted a corn and soybean rotation in the southern part of the field where losses of topsoil were less. We started this in 2004.”

The changes have been incredible in terms of reducing soil erosion.

“Heavy spring rains and little soybean residue resulted in spikes in soil loss, but we saw a huge drop in sediment loss when we went to cover crops and no-till,” Kitchen said. “We lost two tons per acre per year from ‘93 to ’03. Since ‘04 the loss the field is less than half a ton per acre per year while total losses in the watershed actually went up due to the significant rain events we had during that time. There was a very huge change hydrologically in the field with cover crops and no-till.”

At the same time, there was a 5% yield increase in corn yields and a 9% increase in soybean yields in the field with the changes since 2004. The stability of the yields from year to year also improved with cover crops and no-till.

This, of course, seems like a clear win for everything and everyone. Hooray! Cover crops and no-till are the clear answer. But wait — there is more.

While the agronomic changes did exactly what they were intended to do, they also did some things they were not supposed to do. After all, agriculture does not exist in a vacuum.

“There was an uptick of dissolved phosphorus loss in the field. The total phosphorus loss is much less, but the dissolved phosphorus has ticked up,” Kitchen said. “Voles also became a serious problem. When you get all of those residues out there you get food chains. A vole is better than a rabbit at breeding and propagating. We saw a 5% to 7% yield loss in soybeans last year from voles. They came on very quickly. They have a gestation period of three weeks. That crop residue represents food for the soil and also cover for pests and a very active food chain.”

So, here is a simplified series of equations summarizing the situation.

- Stopping erosion and boosting yields = Very good
- No-till and cover crops = good
- Loss of dissolved phosphorus and increased pest pressure = bad

Discussions highlighting practices that lead to increases in dissolved phosphorus in Ohio where the whole state has gone water quality crazy = Very, very bad

That, my friends, is the problem. Every decision with regard to farming the land has results, and they almost always are a mix of both bad and good results. The dissolved phosphorus and pest problem in the field could be simply solved with tillage, but then you have erosion and you start the process all over again.

To make matters worse, every field is different and solutions in one area may just cause more problems somewhere else. I understand everyone wants to solve the problem of water quality, and many really smart people are working on how to do just that. But, in short, they don’t know yet how to fix it because every solution brings a new set of problems. And, this example is just for agriculture, which is only one part of a very broad set of contributions to the problem of toxic algae in lakes.

To find the answers for maintaining the ideal agricultural balance of food, water and viable farms, we don’t need more legislative, regulatory and shortsighted solutions. We need research, science, thoughtful analysis and time — that is the equation for improving water quality.