Leveraging Biology

by Matt Hagny

SCIENCE

Matt Hagny is a consulting agronomist for no-till systems, based in Salina, KS

In the Big Picture perspective, all we're trying to do out in those fields of crops is to 'leverage' the biology to our benefit—to extract a little more than we put in (hopefully a whole lot more, but this is often not the case unfortunately). After all, the crops we grow are merely slightly altered forms of wild plants—selected over the millennia to be more 'user-friendly' than their wild cousins, often with traits such as larger seeds for easier harvesting or processing, less dormancy, more responsiveness to fertilizers, etc. But in the search for greater efficiencies, crop genetics are only one piece of the puzzle.

Think of your fields as ecosystems—you can't sterilize the whole thing and have only the crop out there. Nature isn't easily confined or excluded. Life is quite resilient—the biology just can't be kept out without extreme measures. Think about your shower curtain or bathroom tile—no matter what you scrub it with, the mildew and other living 'gunk' show up again in a few weeks. Or how about hospitals—supposedly nice and sterile, right? Not so—a high percentage of nasty infections and diseases are transmitted during hospital stays and medical procedures, despite the advances of modern medicine. So a person can hardly expect to have complete control over big fields of crops, in the great outdoors—at least not without massive technology, deployed at a staggering cost.

We need to look for ways to manipulate the system to get what we want—to find those places where we can exert small pressures and produce big changes, to leverage biology in our favor.

Instead of focusing on wiping out the population of pesky organisms, we should instead be looking to avoid the confrontation, or at getting the suppression some other way. 'Brute force' technology generally fails to subdue biology—the technology is very costly, plus, the target often evades the control measure (particularly if used repeatedly), and the side-effects are sometimes unanticipated and unpleasant. So we need to look for ways to manipulate the system to get what we want—to find those places where we can exert small pressures and produce big changes, to leverage biology in our favor. Give me a lever and a place to stand, and I will move the world. Or at least nudge it. Really, what we want to do is mostly observing, with very little intervening—a good system will run fine by itself much of the time.

Hired Guns

While some 'rules' undergird the whole shebang, most of the practical pieces must be learned in dribs and drabs—the effects are often rather specific to a location and the circumstances involved, and not all that predictable (at least with our current knowledge). What *is* predictable: for much of what you could want done, biology provides a way, although sometimes the pace is too slow for us.

One of the most visible ways of leveraging biology is using beneficial organisms to control harmful ones—essentially nurture your allies and let them fight your wars for you. We've heard about the importance of "beneficials" for years, and how some farmers purchase and release beneficials in their fields to boost numbers—i.e., biocontrol. The problem was in having to purchase and release them. Why not ensure that their numbers were high from the start? This is what can occur in a well-managed no-till system. Keeping crop residues on the surface holds moisture and creates an

Photo by Matt Hagny.

Technology is nice, but growing healthy crops is often accomplished more profitably with diverse rotations, no-till, and good agronomy.