



Science
Societies

Yield, scale, and crop production realities

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Modern agriculture faces no shortage of challenges, from climate pressures to the need for higher yields and greater efficiency. But one of the industry's biggest hurdles may be helping the public understand how modern farming

practices, technology, and scale can actually support conservation and sustainability.

I was recently asked to be on a panel discussing current and future challenges for the industry of agriculture. We talked about all the usual suspects. Increasing yields while also not losing (or gaining) efficiency, climate challenges, adoption of technology, conservation, modern farm management, and resilient rural communities. But this was a panel presenting to ag-minded young people, and one very common theme was the importance of increased communication. Certainly, there's a need within the industry to share concerns and priorities, but there's also a need to engage more effectively with the non-ag public. Often, when consumers hear terms like "synthetic inputs," "commercial scale," or "crop protection," the default assumption is that less is inherently better for the environment. The popular ideal is localized, input-free production.

While the sentiment comes from a good place, it overlooks a foundational agronomic truth: yield density is our best conservation tool.

Without targeted crop protection, high-efficiency synthetic plant nutrition, and advanced genetic breeding, crop yields can drop significantly. To make up for that loss and feed a global population of 8+ billion, agriculture would likely have to expand its footprint—converting millions of acres of forests, wetlands, and native grasslands into

farmland.

If we don't continue to develop and adopt technology, we risk losing the ability to choose precision over volume. Modern commercial farming isn't about dumping inputs into the system; it's about efficiency of those supplied inputs. Variable-rate technology, targeted-release nutrition, and site-specific crop protection mean we are applying less product per unit of food produced today than ever before.

We need farms of all shapes and sizes, but larger farm scale often facilitates efficiency. Scale allows operations to invest in cutting-edge conservation equipment and technology—from sub-inch GPS guidance to smart spot sprayers—that make precision management economically viable.

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