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Caption: Curtis Millsap of Millsap Farms in Springfield, Missouri leads a workday at the farm where they implemented manual weeding practices in the carrot rows.

Can we really feed the world with organic agriculture?

The age-old argument of food production versus biodiversity, both organic and conventional, is a topic that Curtis Millsap of Millsap Farms in Springfield, Missouri is enthusiastic about. While it is a complex topic with a multitude of varying opinions in Millsap's mind the answer is simple ... Yes.

Millsap explained that for the first 10,000 years of agriculture, everything was farmed without the use of synthetic chemicals and pest control. Even today, in many parts of the developing

world, conventional agriculture does not exist. Farms and people do not always have the ability, desire or the financial resources needed to access and utilize ag chemicals.

Organic farming is farming where synthetic chemical inputs such as synthetic fertilizers, synthetic pesticides and synthetic herbicides are not used and instead farmers focus on the health of the soil and/or the health of the plant or livestock while placing a lot of attention and efforts into biodiversity. Biodiversity may be defined as the wide variety of micro-organisms, plants and animals that may exist and contribute to the land, food production and health of the land.

On the opposite end of the spectrum is conventional agriculture. This type of agriculture incorporates the use of agrochemicals to maximize the yields of food production. Oftentimes, the seeds utilized in conventional agriculture are genetically engineered seeds. Genetically engineered seeds are manufactured to ensure the maximum productivity of crops.

While conventional agriculture tends to lead to larger yields of food production, there appears to be a recent shift towards a more sustainable farming model.

“We know more, have access to more knowledge, have more research, time and energy than we have ever had in any point in the history of the world and so right now there is an increasing amount of attention being paid to organic agriculture in that world; and that is really powerful,” said Millsap.

Millsap isn't the only one interested in analyzing these two types of agriculture. Scientists and professors at the School of Biology at the University of Leeds, the Institute for Crop and Soil Science at Julius Kühn-Institute and the Institute of Biodiversity at the Thünen Institute conducted studies that examined benefits and defined costs that are associated with distinct types of agricultural management. Research was conducted on organic as well as conventional farms in lowland England. The crops examined were a single type of winter cereal which predominately consisted of winter wheat crops.

The scientist's research concluded that 54% lower yields of crop production existed per unit area in organic farming compared to conventional agriculture in these lowland fields. But that same research indicated an increase in some types of biodiversity in organic fields. Scientists found that an abundance of specific species densities including earthworms, bumblebees, epigeal arthropods and butterflies existed on the organic farms in greater numbers than the conventional.

Millsap argues though that “some years the conventional crops will outperform the organic crops and other years the organic crops outperform the conventional but on average, organic produces as well if not slightly better than the conventional crops.”

In conventional farming, a tradeoff occurs. Yes, more food may be able to be produced but what does that look like for our environment and eco systems around the world? Research has found that conventional farmer’s use of synthetic chemicals to increase yield is also increasing the number of neurotoxins contained in the food the general population consumes.

The study also claimed though that the negative effects of pesticides on farm taxa may also be affected by other management decisions such as amounts of chemical fertilizer used and the length of crop rotations in the fields and not solely based on the use of pesticides.

So how does the farming community move forward and what are the next steps for the conventional and organic agriculture industry?

“The limiting factor is knowledge. Knowledge drives innovation, it drives our ability to be resilient and so the more time and energy that we put into organic farming, the better we are going to get at it,” says Millsap.

Land sparing and land sharing are strategies that Scientists and Professors investigated within their research. A land sparing model would include separate areas completely dedicated to species and wildlife void of high crop yields. Land sharing consists of low-density agriculture with high density of wildlife and biodiversity. While these models may be ideal, a slower more partner-centric balance may be found when conventional agriculture meets organic agriculture in the middle and everyone realizes that all farmers have a long-standing relationship with the soil as well as a common goal to be stewards of the land.

This partnership is found in regenerative agriculture. Regenerative agriculture is a hybrid way of farming. The goals of regenerative agriculture are simple. Farmers practicing regenerative agriculture do so in order to not only lessen the overall amount of synthetic chemicals that conventional farming introduces into the soil, but to also actively work to increase the quality of the earth’s topsoil while not only improving food production but also the farmers financial income.

While not completely organic, Millsap supports this style of farming as well. “The science fares out that it has better implications for the environment, has better implications for the overall ecosystem and that of course also has better implications for humans.”