

Shedding light on debate over organic vs. conventional agriculture: Study calls for combining best of both approaches

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(Phys.org) -- Can organic agriculture feed the world?

Although organic techniques may not be able to do the job alone, they do have an important role to play in feeding a growing [global population](#) while minimizing [environmental damage](#), according to researchers at McGill University and the University of Minnesota.

A new study published in *Nature* concludes that [crop yields](#) from [organic farming](#) are generally lower than from conventional agriculture. That is particularly true for [cereals](#), which are [staples](#) of the human diet – yet the yield gap is much less significant for certain crops, and under certain

growing conditions, according to the researchers.

The study, which represents a comprehensive analysis of the current scientific literature on organic-to-conventional yield comparisons, aims to shed light on the often heated debate over organic versus conventional farming. Some people point to conventional agriculture as a big environmental threat that undercuts biodiversity and water resources, while releasing greenhouse gases. Others argue that large-scale organic farming would take up more land and make food unaffordable for most of the world's poor and hungry.

"To achieve sustainable food security we will likely need many different techniques – including organic, conventional, and possible 'hybrid' systems – to produce more food at affordable prices, ensure livelihoods to farmers, and reduce the environmental costs of agriculture," the researchers conclude.

Overall, organic yields are 25% lower than conventional, the study finds. The difference varies widely across crop types and species, however. Yields of legumes and perennials (such as soybeans and fruits), for example, are much closer to those of conventional crops, according to the study, conducted by doctoral student Verena Seufert and Geography professor Navin Ramankutty of McGill and Prof. Jonathan Foley of the University of Minnesota's Institute on the Environment.

What's more, when best management practices are used for organic crops, overall yields are just 13% lower than conventional levels. "These results suggest that today's organic systems may nearly rival conventional yields in some cases – with particular crop types, growing conditions and management practices – but often they do not," the researchers write. Improvements in organic management techniques, or adoption of [organic agriculture](#) under environmental conditions where it performs best, may help close the yield gap, they indicate.

"Our study indicates that organically fertilized systems might require higher nitrogen inputs to achieve high yields as organic nitrogen is less readily available to crops. In some cases, organic farmers may therefore benefit by making limited use of chemical fertilizers instead of relying only on manure to supply nitrogen to their crops," Seufert says. "At the same time, conventional agriculture can learn from successful organic systems and implement practices that have shown environmental benefits, such as increased crop diversity and use of crop residues."

Yields are only part of a set of economic, social and environmental factors that should be considered when gauging the benefits of different farming systems, the researchers note. "Maybe people are asking the wrong question," Prof Ramankutty says. "Instead of asking if food is organically grown, maybe we should be asking if it's sustainably grown."

The results point to a need to get beyond the black-and-white, ideological debates that often pit advocates of organic and local foods against proponents of conventional agriculture, Prof. Foley adds. "By combining organic and conventional practices in a way that maximizes food production and social good while minimizing adverse environmental impact, we can create a truly sustainable food system."

Provided by McGill University

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