

# Pulse crops may reduce energy use and increase yields for farmers

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Farmers who rotate pulse crops with wheat have reduced energy usage and a higher wheat yield than farmers growing wheat exclusively, according to an MSU study.

Mac Burgess, a doctoral candidate in the Department of Land Resources and Environmental Sciences, surveyed Montana farmers who had grown [wheat](#) in one field over two years, and rotated pulse crops with wheat in an adjacent field over the same time period.

"Farmers who are concerned about exposure to volatility of [energy](#) prices, could consider putting some acreage into pulse crops," Burgess said. "They'd save money on the front end and expect a higher yield of wheat the next year."

Energy input includes more than just the diesel to run a tractor, according to Burgess. Manufacture and maintenance of farm equipment and manufacture of chemicals and fertilizer also contribute to the amount of [fossil fuels](#) required for farming.

"Over half of the energy that goes into [wheat production](#) is for the manufacture of nitrogen fertilizer," Burgess said.

Pea and lentil are the primary pulse crops in Montana. Bacteria on the roots of these legumes fix [atmospheric nitrogen](#) and convert it to a form that can be used by plants. Burgess expected farmers who rotated pulse crops with wheat would use less nitrogen fertilizer on their wheat since

nitrogen was fixed by the pulse crop.

In fact, Burgess discovered that the farmers he surveyed only reduced nitrogen fertilizer by six-and-a-half pounds per acre on average, but they had a seven bushel per acre higher wheat yield in the second year than if they had grown wheat only. While the fertilizer input was similar, the end result was a lower energy use per bushel of wheat.

The study shows that the rotational effects on net energy productivity of cereals was larger than the difference between pulses and cereals in the first year. Also, the effect of increased cereal yield was larger than that due to decreased [nitrogen fertilizer](#).

"I was surprised that the energy benefits were larger in the second year of the crop sequence than the energy savings in growing a pulse vs. wheat in the first year," said Perry Miller, sustainable cropping systems specialist at Montana State University and Burgess' advisor.

"Farmers have long claimed rotational benefits that are larger than I have measured in my many plot-scale studies. I was skeptical of their claims but this is proof that the farmers were correct."

For Burgess, the study results are about more than helping farmers decide what to plant.

"I think there is value to Montana farmers in consumers everywhere knowing that pulses are energy efficient and contribute to the energy efficiency of wheat production in this region," Burgess said. "If this research motivates people to eat more pulses, it's a win-win."

Provided by Montana State University

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