



Science
Societies

Switchgrass biofuel: Better than corn?

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Switchgrass growing in eastern Nebraska. Photo by Peggy Greb, USDA-ARS.

This article is part of our [Down to Earth](#) series, which breaks down and explains food, farming, and environmental sciences for readers of all backgrounds, including those without formal scientific training.

Many crops are grown not for food, but for use in the biofuel industry, which seeks to produce sustainable alternatives to oil that still meet America's energy needs. A study published in the [Journal of Environmental Quality](#) found that switchgrass can be grown as a more sustainable alternative to corn, even reducing groundwater contaminants by up to 80%. However, there are pros and cons to both crops that need to be further assessed.

Demand for sustainable fuel sources in the U.S. is high. Multiple government agencies aim to reduce fuel emissions—for example, the Department of Energy, Department of Transportation, and USDA plan to [produce 35 billion gallons of domestic renewable aviation fuel by 2050](#). But in order for this alternative fuel source to be truly “green,” the crop itself has to be ecofriendly while still producing high yields.

Agriculture requires large amounts of fertilizer inputs and emits greenhouse gases. But crops can be bred to produce high amounts of biofuel with minimal harm to the environment. Switchgrass breeds specifically designed for biofuel production can help the energy industry reach its sustainable fuel goals.

There's a new [crop] in town

Corn ethanol is one of the most [common sources of biofuels in the U.S.](#) But there are many other sources of “unconventional” fuel, too, and some have great ecological and economic benefits. There are multiple reasons why a farmer might want to grow switchgrass for biofuel production. The crop requires much less fertilizer to grow than corn. Switchgrass can also grow along the edges of farms, taking up less space while still providing the surrounding farmland benefits—it’s been shown to keep soil healthy and its large roots can prevent nutrient loss.

But there is much more work to be done to fully understand the crop’s impact. Previous work on switchgrass benefits has been limited to certain locations and older crop breeds. So, researchers at the University of Illinois grew corn and switchgrass for three years while comparing greenhouse gas emissions, water use, and potential groundwater contamination. They found that after three years:

- Switchgrass leached 80% less nitrogen-based compounds than corn. Leached nitrates can negatively affect groundwater quality, so reducing this source of contamination is key to improving water health.
- Greenhouse gas results were mixed. While switchgrass emitted less nitrous oxide than corn, its carbon dioxide emissions were 50% higher.
- Switchgrass and corn had similar evapotranspiration rates—water moved from the plants and soil into the atmosphere at similar rates in both systems. This indicates that planting switchgrass instead of corn doesn’t impact the water cycle (or a farmer’s irrigation needs).

Studies like this promote the usage of bioenergy crops and show that, by choosing specific crops, we can invest in clean energy and healthy agricultural systems.

However, further studies are needed to refine what we know about switchgrass, such as how we can limit carbon dioxide emissions. The researchers hypothesized that the

large root systems of switchgrass—filled with breathing bacteria, fungi, and other microbes—might be partially responsible for the high carbon dioxide emissions. They proposed future studies putting this hypothesis to the test while also assessing if different kinds of switchgrass plants have different carbon dioxide emission rates. Overall, switchgrass has shown a lot of promise as a sustainable source of fuel. With further research, it could become a bigger name in the agriculture and energy industries.

Dig deeper

Namoi, N., Lin, C.-H., Jang, C., Wasonga, D., Zumpf, C., Arshad, M. U., Heaton, E., & Lee, D. (2025). Field-scale evaluation of ecosystem service benefits of bioenergy switchgrass. *Journal of Environmental Quality*, 54, 576–589.

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