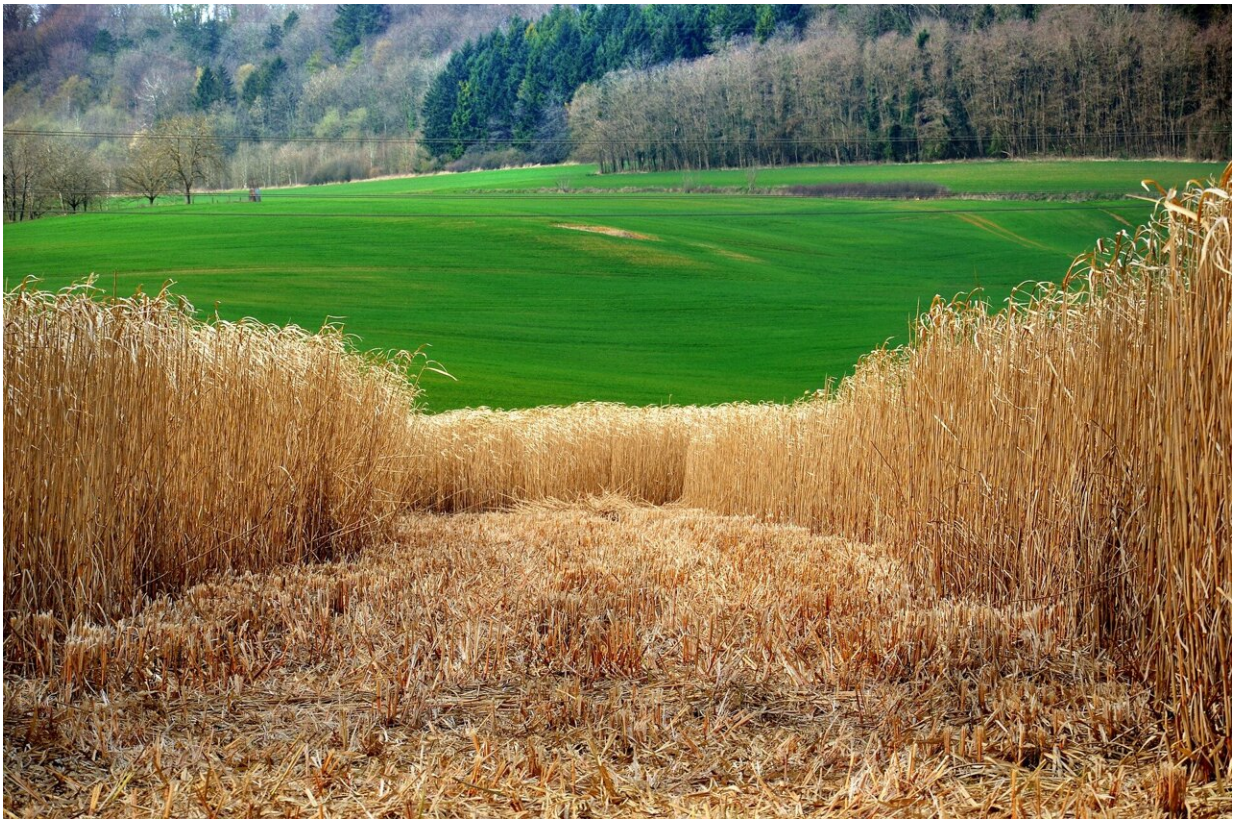


# The best bioenergy crops for the North Carolina Piedmont

July 7 2021

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Credit: Pixabay/CC0 Public Domain

Traditional crops are not a good match for all farmland, such as parts of the North Carolina Piedmont region.

Here, farmers need more options because some of the soils are poor, have been eroded, and often experience drought. Bioenergy crops may be a good option on these lands.

Josh Heitman, a member of the American Society of Agronomy, studies bioenergy crops in the North Carolina Piedmont. Heitman's research looks at how much water bioenergy crops use and how much biomass they yield. The work was recently published in *Agronomy Journal*.

"It is a temperate humid region where typical agricultural systems include grain and forage crops," Heitman explains. "But in this part of the state there are areas that are not used for commodity crop production. So, the Piedmont region has been regarded as a candidate location for growing bioenergy crops."

Their study included five different plants. There were two annual crops—corn and sorghum—and three [perennial crops](#)—miscanthus, switchgrass, and fescue. Annuals are plants that die off at the end of the growing season and must be replanted each year. Perennials continue to come back or grow year after year.

These growth patterns mean that they use water in different ways. The researchers were particularly interested in the plants' water-use efficiency. The best plants will be able to grow a large amount with little water.

Sun, humidity, wind, soil texture, plant characteristics, and more all influence crop water use. In addition, there are pros and cons of annuals and perennials. Annuals grow faster right away, may use more water, and their shallow root systems make them susceptible to drought. Perennials grow slower and take time to get established. They can be more adapted to drought but if they grow too slowly may end up using a lot of water since they live longer than annuals.

Overall, the researchers found the annuals and miscanthus checked many of the right boxes in their study.

"Our study showed that switchgrass and fescue have low water-use efficiency in the Piedmont region because of their long growing season and low biomass yields," Heitman says. "Corn, sorghum, and miscanthus performed well at our study site and can be good alternative candidates to traditional grain and forage production systems that are common in that region. Because corn and bioenergy sorghum are annual crops with high growth and water use rates, they can be more susceptible to episodic drought than miscanthus."

When it comes to getting farmers to pursue planting bioenergy crops, they have several decisions to make and hurdles to overcome. They may need to invest in new farm equipment to manage the crop. Farmers also have to consider if there is demand for biofuel in their local industry.

The researchers say that helping producers find multiple options for the crops and where they can be planted is important. Their work to help farmers anticipate the most productive crops and their needs is critical, they say. It will support adoption for both financial and practical reasons.

"What we envision is for [bioenergy crops](#) to be cultivated in marginal lands," Heitman says. "The idea would be to allocate these crops to land units that do not support high yields for commodity crops so that competition for arable land can be kept to a minimum."

He adds that as a next step they are looking at the water use of miscanthus and corn in another region of North Carolina, the Coastal Plain. There the soil cannot store much [water](#), which can limit the productivity of [crops](#).

"This research personally interests me as I believe that it has value in

helping producers make decisions about establishing [bioenergy](#) cropping systems," Heitman says. "Evaluating how well a cropping system uses its resources and could provide the producer with the highest or most consistent yields is the most interesting part of this research to me."

Josh Heitman is a professor at North Carolina State University. This research was supported by the North Carolina Department of Agricultural and Consumer Services Bioenergy Research Initiative.

**More information:** Thomas D. Stephenson et al, Water use and biomass yield of bioenergy crops in the North Carolina Piedmont, *Agronomy Journal* (2021). [DOI: 10.1002/agj2.20646](https://doi.org/10.1002/agj2.20646)

Provided by Soil Science Society of America

Citation: The best bioenergy crops for the North Carolina Piedmont (2021, July 7) retrieved 25 April 2024 from <https://phys.org/news/2021-07-bioenergy-crops-north-carolina-piedmont.html>

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