

# Plant variants point the way to improved biofuel production

September 22 2014

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Manufacturing biofuels from food crop by-products such as straw could be made quicker and cheaper thanks to the work of scientists in the UK and France.

Researchers funded by the Biotechnology and Biological Sciences Research Council (BBSRC) have discovered variant [straw](#) plants whose cell walls are more easily broken down to make biofuels, but which are not significantly smaller or weaker than regular plants.

The discovery could help ease pressure on global food security as biofuels from non-food crops become easier and cheaper to make.

The impact of carbon emissions on global warming is driving the need for carbon neutral biofuels. Many existing biofuels are produced from crops which can be used for food, and therefore have a negative impact on global food security.

One answer is to make fuels from woody, non-food parts of plants such as straw. These are rich in polysaccharides (sugar chains) which can be broken down into simple sugars and then fermented into ethanol for fuel.

However, such biofuels are currently too expensive because of the cost of digesting the woody tissues into [simple sugars](#).

Researchers in the Centre for Novel Agricultural Products at the University of York led by Professor Simon McQueen-Mason, working

with colleagues in France, screened a large collection of variants of the model grass species *Brachypodium* for digestibility.

Screening variants in this way allows rapid assessment of the range of natural diversity that can be found in a species.

Using this approach, PhD student Poppy Marriott identified 12 independent plant lines with highly digestible straw, but which grew normally and showed no decrease in straw strength.

Analysing these plants showed that increased digestibility can be achieved through a range of changes in the cell wall, where the majority of sugar is contained in woody biomass.

In addition the team at York also showed they can identify the gene alterations that give rise to the high digestibility.

The new results are published in the latest edition of the *Proceedings of the National Academy of Sciences USA*.

By identifying these plant variants with straw that is easier to digest, but which retain their size and strength, the cost and complexity of [biofuel](#) production could be reduced.

Professor McQueen-Mason said: "This work sets the stage for identifying similar high-digestibility lines in commercial crop species that will pave the way to more cost-effective and sustainable biofuels.

"Using plant by-products such as straw provides a double benefit as we can harvest the food from the plant, then use the straw to produce a carbon neutral fuel."

Professor Melanie Welham, BBSRC Executive Director for Science,

said: "This research is another important step towards making carbon-neutral biofuels both easier and cheaper to produce. Using crop by-products such as straw for biofuels reduces pressure on [food](#) supplies and also adds value to the crop, boosting [food security](#) and helping farmers.

"It is just one example of how BBSRC investment in world class bioscience is working towards addressing some of the existing and emerging global challenges that we all face."

**More information:** A range of cell wall alterations enhance saccharification in *Brachypodium distachyon* mutants, *Proceedings of the National Academy of Sciences*, 2014:

[www.pnas.org/cgi/doi/10.1073/pnas.1414020111](http://www.pnas.org/cgi/doi/10.1073/pnas.1414020111)

Provided by Biotechnology and Biological Sciences Research Council

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