

Sweet success for sustainable biofuel research

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Scientists have found a way to increase fermentable sugar stores in plants which could lead to plant biomass being easier to convert into eco-friendly sustainable biofuels. Their research is highlighted in the latest issue of *Business*, the quarterly highlights magazine of the Biotechnology and Biological Sciences Research Council (BBSRC).

Energy is released in a usable form from biomass when biodegradable matter such as wood or straw is burnt or fermented. Fuel for use in cars is produced by fermentation. To make the fermentation process more efficient and to maximise [energy conversion](#) a better understanding of the release of sugars from plant cell walls is crucial and researchers from the University of Cambridge are doing just that.

Using the [plant *Arabidopsis*](#), Dr Paul Dupree and his team have found three enzymes responsible for the production of all detectable levels of a type of sugar called glucomannan. Their research also shows that the quantity of glucomannan can be increased or decreased in the stem with no visible detrimental effects on plant development or cell wall strength. However, the researchers found that changes in glucomannan levels had a detrimental effect on seed development.

Dr Dupree explains: "We now know that it may be possible to increase glucomannan specifically in harvestable plant organs, such as stems. This could be very beneficial for the production of bioenergy crops where higher proportions of enzyme-accessible fermentable sugars, such as those in glucomannan, could lead to higher yields of fuel. Achieving

higher fuel yields from crops will increase the likelihood of sustainable and economic biofuels displacing fossil fuels."

The increases in fermentable sugar achieved so far are encouraging, but further work is needed to understand how to make substantial improvements in crop species. If the biomass plant material is sourced sustainably, from non-food crops and waste, then this research could help to contribute to significantly increasing the supply of eco-friendly biofuels.

Commenting on the research, BBSRC Chief Executive Professor Doug Kell, said: "Sustainability issues, environmental factors and economic pressures all mean there is an urgent need to find renewable energy sources. Plant-based biomass from non-food crops and waste offers an effective alternative, but to make the process more efficient, we need to examine ways of optimising the plant matter we use to produce fuels. Research such as that being conducted by the BBSRC Sustainable Bioenergy Centre is harnessing the power of fundamental plant science to develop realistic alternatives to oil-based transport fuels that do not threaten the food chain or the environment."

Dr Dupree leads the Cell Wall Sugars Research Programme within the BBSRC Sustainable Bioenergy Centre. This work is featured in the Winter issue of *Business* and the findings were recently published in *The Plant Journal*.

More information: The full research paper was published in *The Plant Journal*: Goubet F, Barton CJ, Mortimer JC, Yu X, Zhang Z, Miles GP, Richens J, Liepman AH, Seffen K, Dupree P. (2009) Cell wall glucomannan in *Arabidopsis* is synthesised by CSLA glycosyltransferases, and influences the progression of embryogenesis. *Plant J.* 60(3):527-38

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