

IUPUI Scientist Works on Ethanol Breakthrough

Mark Goebel is developing a mutant yeast that would reduce or eliminate the need to use corn to make ethanol. His work is part of the Richard G. Lugar Center for Renewable Energy.

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Transcript

[M. Goebel] Ethanol can be made fairly easily from corn. Corn is ok if you worry about just how sustainable this is. It'd be far better if we could use crops, which don't go to food, where you can use a lot more of the plant material to generate this ethanol and that's what we'd like to try and do—make it more feasible to use virtually anything as a potential source of ethanol. When you use corn you're really only using the kernels, the part that someone would eat. And it's really easy to use. It's almost all starch. You can easily turn that into glucose, which is the sugar that you ferment. In reality, almost all of the material in plants can be fermented. The trick is that it's not as easy as a source as starch is to break down the glucose, and it also turns out to be broken down into sugars, which are more complicated or more difficult to ferment than glucose itself.

In fact, probably half of the fermentable material is actually a sugar known as xylose, which requires a fairly different series of metabolic reactions in order to convert it, at least initially, into something that can be fermented into ethanol.

Well, the yeasts do it because they're built that way, but it turns out that they don't have to do it that way. It's actually quite easy to modify them genetically. What we've been able to do is take advantage of this easy manipulation that you can do genetically, and take yeasts which really have a strong preference for glucose and completely eliminate that preference so that a lot of other sugars, including the major sugar that is present in plant biomaterial, now becomes a more readily usable source of fermentation to ethanol. There's probably some plants, which would be more optimal in terms of how readily they can accumulate a lot of carbon into their biomass over a certain amount of time, but in reality, virtually any plant material also becomes suitable. Now we're just trying to find out those plants, which can most easily generate the most biomass most quickly. But in reality, any plant also becomes an instant possibility as a source for generating ethanol.