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### **Biofuel and Agriculture: a look at spillover effects**

Biofuels have been gaining serious interest and popularity as the world's demand for oil has become more widely recognized as a problem. Although biofuels are considered to be an environmentally friendly alternative to petroleum, the idea of any large scale use raises many questions. Ethanol is one type of biofuel that has been given a particularly large amount of attention. In March, President Bush announced a new "25 x 25" strategy that aims to produce 25% of the nation's energy by the year 2025<sup>1</sup>. Some may see the adaptation of these alternative fuels as an opportunity to not only reduce our importation of foreign oil, but also to reduce the emission of Green House Gasses (GHG). It sounds like a great plan, but how practical is it? Converting most of our energy consumption from petroleum based fuel to biofuels may have serious consequences that must be accounted for when thinking about implementing such a plan. For starters, the agricultural industry has already been greatly affected by the increasing demand for ethanol. Such a huge change in the demands for certain crops may be seriously influenced and complicated by already existing subsidies on certain commodities and biofuel, all of which will inevitably have a serious impact on the price of food and its availability. Given the already questionable farming practices associated with industrial agricultural, any further intensification (which would have to occur in order to meet both fuel and food demands) implies an increase in environmental degradation.

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<sup>1</sup> Luscombe, Richard and Goddard, Jacqui (2007) "New Gold Rush Grips US Farms- corn for fuel" *The Scotsman* [www.news.scotsman.com](http://www.news.scotsman.com)

## **What is biofuel?**

Although I will be focusing mostly on ethanol made from corn, there are many different types of biofuel. The two most often produced are ethanol and biodiesel. Ethanol is made from sugar or starchy plant substances. Most of the ethanol produced in the US is made from corn, in Brazil it is made from sugar cane and in the EU it is often derived from sugar beets<sup>2</sup>. Biodiesel is usually made from soybeans in the US and Canola in the EU.

Although it is not currently economically viable, a third type of biofuel that I think is important to mention is cellulosic ethanol. This is a type of ethanol which is made from plant cellulose. Cellulosic ethanol can be made from grasses, wood, or almost any other type of plant material, so it would not require the same intensive inputs that other biofuels require<sup>3</sup>. Also, land of much lower quality could be used which would prevent the competition for food, thus eliminating the issue of food scarcity or increased food costs. And, most likely, production of cellulosic ethanol would not require high amounts of fertilizers and pesticides. However, one reason for serious concern regarding the implementation of this technology is the possibility of the extensive cultivation of invasive grasses. Miscanthus grass is often praised by proponents of cellulosic ethanol because it grows to be very large in a very short amount of time, thus producing a lot of biomass that can be converted into fuel. But according to Robert N. Wiedermann, who is a professor of entomology, “Most of the traits that are touted as great for biofuel crops—no known pests or diseases, rapid growth, high water-use efficiency—are red flags for

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<sup>2</sup> Berg, Chrisoph (2004) “Word Fuel Ethanol Analysis and Outlook” [www.distil.com](http://www.distil.com)

<sup>3</sup> Olmstead, Julia (2006) “What About the Land” [www.grist.org](http://www.grist.org)

invasive biologists.”<sup>4</sup> The introduction of any invasive species should always be cause for concern, but with the amount land that would be used for biofuels, it could have devastating effects delicate ecosystem.

### **Ag Subsidies, Ethanol & US Corn Farmers:**

Corn farmers are one of the most heavily subsidized farmers in the U.S. From 1995-2004, Corn farmers received more than \$41 billion in federal subsidies—that’s more than wheat and cotton farmers received combined<sup>5</sup>. As a result of all these subsidies, and thus the overproduction of corn, the price of corn has remained very low for quite some time. For the last 20 – 30 years it’s been around \$2 per bushel<sup>6</sup>. Archer Daniels Midland (ADM) is a huge buyer of this cheap corn, using it to produce things like high fructose corn syrup, animal feed, and of course, ethanol. Due to recent increases in demand, the price of both ethanol and corn has been steadily increasing, which means more profits for both ADM and the corn farmers. But, farmers have been opting not to sell to ADM and instead have been pooling their money together, forming partner ships and investing in their own ethanol production facilities. By vertically integrating the corn growing with ethanol production, the farmers not only cut out the middle man and increase their profits, they also protect themselves from future decreases in the price of corn. If the price of corn were to go down, it would just make their ethanol production more profitable.

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<sup>4</sup> University of Arkansas (2006) “Biofuels as Invasive Species?” [www.physorg.com](http://www.physorg.com)

<sup>5</sup> Philpott, Tom (2006) “Ethanomics 101” [www.grist.org](http://www.grist.org)

<sup>6</sup> Ibid.

Currently there are about 113 ethanol plants in the U.S. and 77 under construction—40% of which are owned by farmers<sup>7</sup>. Unfortunately, all this new construction of infrastructure may not work out the way the farmers are hoping it will. The construction of all these new ethanol plants means more entry into the market, and with more entry comes a decrease in the farmers' individual profits. In addition, these new facilities are expected to be producing 16 billion gallons of ethanol per year and will require between 5 and 6 billion bushels of corn<sup>8</sup>. As the demand for corn continues to increase, so will the price of corn, which also will decrease profits for the farmers.

Alternatively, farmers may actually end up with a surplus of corn and ethanol on their hands. One of the driving forces behind the growing demand for ethanol is the 2005 Energy Policy Act which requires the gasoline industry to use 7.5 billion gallons of “renewable” fuel by 2015—that’s almost an 88% increase (4 billion gallons were used in 2005). It is likely that the “renewable” fuel will be in the form of ethanol, but even still, the facilities are expected to produce over twice that amount. Furthermore, ethanol is only competitively priced because it receives a 51 cents per gallon subsidy<sup>9</sup>. If that subsidy were to be taken away, ethanol would no longer be an affordable substitute for gasoline, and the farmers could be out of luck.

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<sup>7</sup> Barrionuevo, Alexei (2007) “Spring Time for Ethanol” *The New York Times*, (January 23, 2007)

<sup>8</sup> Philpott (2006)

<sup>9</sup> Hasset, Kevin (2007) “Ethanol is a Big Scam and Bush Has Fallen For It” *Bloomberg News*  
[www.bloomberg.com](http://www.bloomberg.com)

### **Food Prices & Food Security:**

Even if things did work out for the corn farmers, and the demand for ethanol was high enough to keep their ethanol production profitable, there would be a huge effect on food prices as result of converting so much agricultural land to biofuel crop production. In 2006, the U.S. produced 42% of the world's supply of corn<sup>10</sup>. If all of this corn was turned into ethanol it would only replace 12% of our demand for gasoline<sup>11</sup>, but it would have catastrophic effects on the world's price of corn. In just a six month period, from August 2006-February 2007, the price of corn rose almost 70%<sup>12</sup>. In fact, in Mexico the price of tortillas has already increased 400% and this increase has been directly correlated with the increase in ethanol production<sup>13</sup>. It seems important to keep in mind that these increased food prices are the result of relatively low levels of biofuel production and replacing an almost miniscule amount of our energy demand—less than 12% of corn production was dedicated to ethanol in 2004-2005<sup>14</sup>, but clearly, price effects are already being felt.

### **Effects on the Environment:**

The competition between food and fuel will unavoidably require the expansion as well as the further intensification of agricultural land in order to get higher yields out of both of these kinds of crops. This means more chemical fertilizers, herbicides and pesticides

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<sup>10</sup> US Grain Council (2007) "World Corn Production and Trade" [www.grains.org](http://www.grains.org)

<sup>11</sup> Altieri, Miguel A. and Holt-Gimenez, Eric (2006) "UC's Biotech Benefactors: The Power of Big Finance and Bad Ideas" [www.foodfirst.org](http://www.foodfirst.org)

<sup>12</sup> Technology Review (2007) "Ethanol Demand Threatens Food Prices" MIT [www.technologyreview.com](http://www.technologyreview.com)

<sup>13</sup> Altieri, Miguel A. and Bravo, Elizabeth (2007) "The Ecological and Social Tragedy of Crop-Based Biofuel Production in the Americas" [www.foodfirst.org](http://www.foodfirst.org)

<sup>14</sup> Baker, Allen and Zahniser, Steve. (2006) "Ethanol Reshapes the Corn Market" *Amber Waves* [www.ers.usda.gov](http://www.ers.usda.gov)

(ironically, most of these are petroleum based which makes one question if biofuels are an escape from oil or not). Corn and soy production in the U.S. has already caused severe soil erosion and water pollution<sup>15</sup>. Also, as marginal land gets pulled into production, more water is required to irrigate these dry areas. Furthermore, the combination of petroleum intensive agricultural practices, deforestation resulting from agricultural land expansion, and ethanol emissions may be so severe that it's debatable as to whether or not total GHG emissions will be decreased at all.

**Conclusion:**

Biofuels may be considered a promising alternative fuel, but many costs need to be taken into consideration before any more progress is made. The market of biofuels is already entangled in an already distorted agricultural market, thus complicating the costs and benefits producing biofuel; the increased demand of biofuel crops is increasing food prices; and finally, biofuels encourage greater intensification of agriculture and continuation of unsustainable farming practices. The attempt to rid the U.S. of its “oil addiction” may seem like a good cause, but just because biofuels are an alternative to oil, it doesn't mean they are necessarily the right alternative.

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<sup>15</sup> Olmstead (2006)