# **Drought Scenario 2008:** Potential Impacts on Ethanol Production

# Abstract

Drought's tendency to cover thousands of square miles can leave a large footprint when it comes to impacts on the environment. Year in and year out, the characteristics of this hazard leave agriculture especially vulnerable to drought. The odds of a major, widespread drought disrupting the yield capacity of corn (and many other commodities) in any given year is a concern now and will continue to be so in the future. Undoubtedly, this balance will become even more strained under a changing climate. Compounding the risk is the fact that higher prices, driven partly by the demand for corn by ethanol markets, has led to more acres being put into this "liquid gold" at the expense of other commodities. In addition, previously fallowed or reserve program lands are now being put into production again in order to capitalize on this spike in prices. This indirectly opens up these lands to greater erosion issues along with reducing vital habitat for many species.

The past few years have seen tremendous growth in the building of new ethanol plants (and in essence new markets), which has driven corn prices up to historic highs. The Renewable Fuels Standard (RFS) requires an increase in ethanol production to 5.4 billion gallons a year (bgy) by 2008 and 7.5 bgy by 2012. Nearly 20% of total corn production would be required to feed this industry by 2008. This year, President Bush has challenged the industry by calling for an increase in the use of renewable fuels, mainly ethanol, to 35 billion gallons by 2012, which will replace about 20% of gasoline use.

The National Integrated Drought Information System (NIDIS) is now a reality (H.R.5136). Although in its infancy, the "NIDIS Act of 2006" (under the direction of DOC/NOAA) calls for the development of better drought and impact monitoring, assessment, and prediction and also refers specifically to a need for better drought impact reporting and documentation. This future scenario paper will look at some of the facts, issues, and hypothetical impacts surrounding the ethanol industry and try to highlight the potential vulnerability and risks drought poses to this burgeoning industry. It will also highlight how NIDIS activities might respond as the scenario is taking place.



<b>% U.S. Area Affected</b> (based on DM map for July 22, 2008)			% Area in Extreme or Exceptional Drought in Corn Belt States (based on DM map for July 22, 2008)		
				<u>D3</u>	<u>D4</u>
	7/22/2008	Typical	Illinois	87%	29%
<b>D0</b>	48.62%	21-30%	Iowa	100%	100%
D1	31.07%	11-20%	Nebraska	63%	33%
<b>D2</b>	20.61%	6-10%	Missouri	51%	21%
D3	14.8%	3-5%	Minnesota	57%	14%
<b>D4</b>	4.58%	0-2%	Wisconsin	41%	4%
			Indiana	67%	0%

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# **Drought Causes/Impacts: A Hypothetical Scenario**

- Following a very strong 2007-2008 La Niña winter event, the summer brings very little precipitation coupled with low soil moisture reserves, extreme heat, and high winds
- A persistent high pressure mass sits over the central/southern Plains
- Extreme (D3) and Exceptional (D4) drought spreads to cover most of the Corn/Bean Belt by late July



Based on historic corn production data, we project that the output will reach 12 billion bushels in 2008 and 13 billion bushels by 2012.

\*2007—Historic high: over 93 million acres and 13 billion bushels



### Ethanol Expansion

- The Renewable Fuels Standard (RFS) requires an increase in ethanol production to 5.4 billion gallons a year (bgy) by 2008 and 7.5 bgy by 2012
- 1 bushel of corn yields 2.8 gallons of ethanol using today's technology
- 5.4 bgy of ethanol would require **1.81 billion bushels of** corn, or approximately 17% of the total corn production by the year 2008. Projected to grow more than 30% by 2009/10 (USDA-ERS)
- Currently, over 100 ethanol plants are operating, with over 30 more under construction and several dozen more in the planning stage...a total that will surely be larger by 2008–2010
- 2007 ethanol production was 5.4 bg

# **2008 Drought Impacts on Corn**

- bushels

### Hypothetical 2008 Drought Scenario

- dallons





(NOTE: assuming an extreme (D3) or exceptional drought (D4) reduces corn yields by 40%)

Corn price increases by more than 40% (from \$3.3/bu to around \$4.6/bu). A loss of 5 billion

• A \$1 increase in corn increases expenses by approximately \$18 million for an average-sized ethanol plant (50 million gallon per year output)

• Drought causes an 846-million-bushel shortfall, which reduces ethanol production by 2.4 billion

• This accounts for about 1.7% of total U.S. gasoline consumption (140 billion gallons) • On average, gasoline rates rise 8.5% or from about \$3.00/gallon (now) to more than \$3.26/gallon nationally

• Local communities and plant owners suffer (majority of plants are farmer/cooperatively owned) Increased production costs coupled with lower revenues (loan issues surface) Local income decreased/declining tax revenues and potential job layoffs

What If the Drought Becomes a Multi-Year Drought into 2009?

• Corn supplies continue to drop given previous year's drought (carryover stock tightened) • Ethanol industry must now compete with other corn consumers for a limited supply...driving up the price of corn even more (plant shutdowns and loss of jobs possible)

• Example: A total shutdown of a single 40-million-gallon capacity plant would result in the loss of 100 jobs, reduce personal income by \$4.6 million, and reduce business taxes by \$1.4 million...a big blow to rural communities!





## Solutions



### Early Warning, Mitigation, and Education

NIDIS implementation will provide:

- Better early warning of developing local drought conditions
- Improved forecasts and understanding between drought and ENSO and other oceanic phases
- Encouragement or incentive for drought planning at the local level
- Local risk analyses
- Education materials for officials, including ethanol plant owners

### **Decision Makers Need a More Interactive Way to Assess and** Visualize Drought Risk

- Interactive risk and vulnerability assessment guides (online or CD/DVD)
- Drought planning workshops
- Interactive Drought Monitor DSS
- Access to Electronic Drought Atlas and other tools for local analyses
- Case studies of successful mitigation strategies

### **Possible Mitigation Strategies Housed at a Freely** Accessible NIDIS Portal (Drought.gov)

- Develop a drought plan for a local plant and surrounding community (water supply)
- Improve local drought managing strategies
- Identification of potential financial assistance programs for ethanol producers during drought
- Investigate alternative ethanol plant sources (sorghum, switch grass, cellulosic)
- Conduct a risk analysis to determine vulnerability to (frequency of) severe drought events
- Develop a strategy to increase supply (potentially through ethanol imports)
- during extreme drought events, or expand transportation network Diversify COOP planting strategies given drought forecasts or likeliness