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Global Warming's Next Victim: Wheat

By Bryan Walsh

We're used to watching the price of oil mock gravity, but there's an even more essential commodity that's also become scarcer and pricier in recent months: Traders are paying record prices for wheat on world markets, thanks in part to shortages caused by a mix of drought and flooding. Canada, the second-biggest wheat producer after the U.S., looks set to harvest its smallest crop in five years, due to an unusually dry July, while production in the European Union may be down nearly 40% from last year after flooding rains followed long droughts. Growing global demand for biofuels is also eating up grain production, and boosting prices.

As a result of the supply squeeze, global inventories of wheat — which makes up one-fifth of the world's food intake — are expected to fall to their lowest level in 26 years, according to the U.S. Department of Agriculture.

Tighter supplies mean American consumers will be paying a few cents more for everything from bread to muffins to hamburgers, as meat supplies can be tied to grain prices. And, if the world warms as expected over the coming decades, the terrible farming year of 2007 may be just the beginning. As temperatures rise, many studies predict that crop yields will decline, as the extreme droughts and floods that damaged this year's wheat crops become more common. The most fertile areas are likely to be found further north in response to the heat, opening up the possibility of agriculture in territories such as Siberia that had long been too cold for decent farming. But the same effect could turn current bread-basket regions as the American Midwest into dust bowls.

"In developed countries it means we'll pay more for wheat and other crops," says Matthew Reynolds, a wheat physiologist at the International Maize and Wheat Improvement Center (CIMMYT) in Mexico. "In developing countries, it might mean they'll go without. It's a major food security issue."

Warmth is good for plants, which is why we don't get much corn from Alaska. But beyond a certain temperature — around the mid-30s, celsius —additional heat cuts crop yields, by interfering with photosynthesis until plants literally starve to death. Scientists are not yet able to measure the effect, in part because it might be offset for a time by the additional carbon dioxide that would be present in the atmosphere. C02 is to plants what oxygen is to humans, and all things being equal, more CO2 should speed plant growth. Scientists believe a one-degree temperature increase might actually benefit agriculture. But if the planet warms by around three degrees — a distinct possibility before the end of the century, according to recent assessments by the U.N.'s Intergovernmental Panel on Climate Change — the balance would turn negative, especially in the tropics. "The net result is that you'd have plants that develop faster and aren't able to accumulate mass," says David Lobell of the Lawrence Livermore National Laboratory.

Lobell says global warming has already begun to take food off the world's table. According to a recent study he and his colleagues conducted, the temperature increase that occurred between 1981 and 2002 reduced major cereal crop yields by an annual average of 40 million metric tons — losses worth $5 billion a year. Those losses are sobering, but nothing compared to what might be in store: A recent study sponsored by the Consultative Group on International Agricultural Research forecast a 51% decline in India's wheat-growing land, potentially leaving hundreds of millions hungry. And, last week, China's top meteorological official warned that global warming could cut the nation's grain harvest by 5 to 10% by 2030. And all this will be happening while both countries add more mouths to feed.

Even more important than temperature will the the impact of global warming on rainfall, both too much and too little. It's hard to predict how climate will change rainfall patterns, but the rule of thumb is that dry areas will get drier, wet areas will get wetter, and droughts and flooding will both become more common. The effects of prolonged drought can already be seen in Australia, where consistently dry weather ravaged last year's wheat crop, and threatens to do the same this year. Flooding can destroy entire fields in a single day, and over time can lead to soil erosion and loss, permanently crippling once fertile land. "Water shortages are going to be a major issue for food companies," says Bob Goldin, executive vice-president at the food-industry research firm Technomic. "It will have an impact on agriculture in terms of higher coasts and lower yield."

The silver lining is that warming will make once-frigid northern latitudes more suitable for agriculture. But the new farmland won't make up for the loss of the old, because soils further north in territories such as Siberia or Labrador are thin in nutrients compared to the rich loam of tropical India. The best hope may instead lie in breeding drought and heat-resistant crop strains — which groups such as CIMMYT are already working on — and in tweaking agronomy techniques to conserve water and soil. But

while that might be enough to preserve farming in a rich country like the U.S., very little is being done to prepare developing nations for the agricultural challenges of climate change. "It's the poor counties that will suffer the most," says Reynolds. That much, at least, won't change.

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