Public release date: 19-Feb-2008
[Print Article | E-mail Article | Close Window]

Contact: Thomas Hargrove
thargrove@ifdc.org
256-381-6600
IFDC

World fertilizer prices soar as food and fuel economies merge

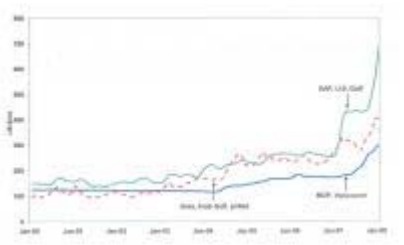
Global fertilizer prices rose more than 200% in 2007 as farmers applied more fertilizer to maximize production of corn -- now used for ethanol -- at record prices; hardest hit are African farmers who need fertilizer to replenish nutrient-depleted soils

World fertilizer prices rose steadily from 2004 through 2006—then soared in 2007. Food prices also rose sharply. Reasons include new demands for food crops, especially corn (or maize), for ethanol and other biofuels, increased energy and freight prices, higher demand for grain-fed meat in the emerging economies of China, India, and Brazil, and increased use of natural gas as liquefied natural gas (LNG), says Dr. Balu Bumb, leader of the Policy, Trade, and Markets Program of IFDC—An International Center for Soil Fertility and Agricultural Development.

The IFDC Market Information Unit conducts systematic data and information studies of the global fertilizer industry. Left to right are Dr. Balu Bumb, leader of the IFDC Policy, Trade, and...
Click here for more information.

"Farmers in industrialized countries are applying high levels of fertilizers to maximize harvests of grain at the highest prices ever," Bumb says. "Those forces drive fertilizer prices higher."

The highest price rise in 2007 was for diammonium phosphate (DAP). The U.S. Gulf price for DAP was about $252 per ton in January 2007—but had almost tripled a year later, rising to $752 by January 2008.



Monthly averages of fertilizer prices from 2000 to 2008. World fertilizer prices -- especially diammonium phosphate -- have skyrocketed during 2007. FOB = Free on board. Average price, with supplier...
Click here for more information.

Similarly, the Arab Gulf price of prilled urea rose from $272 to $415 per ton in the same period, and the Vancouver price of muriate of potash (MOP) rose from $172 to $352.

The price of 1 metric ton of corn—traditionally the main ingredient of livestock feed and now the main raw material used for biofuels in the United States—rose from $3.05/bushel in January 2007 to $4.28/bushel in January 2008 ($120 to $168/metric ton). The price of 1 US gallon [3.8 liters] of milk also rose from $3.20 to $3.87 in the United States from January 2006 to December 2007.

Implications for Developing Countries

"The unprecedented rise in fertilizer prices—more than 200% in the past year—is creating a fertilizer crisis for resource-poor farmers in developing countries," Bumb says. "Particularly hard-hit are farmers in Sub-Saharan Africa. Farmers there need fertilizers desperately, to replenish their nutrient-depleted soils. But fertilizer use in Africa is the world's lowest—about 8 kg per hectare. The lack of fertilizers in Africa accentuates hunger and poverty. To stimulate adequate fertilizer use, the purchasing power of the poorest of the poor must be enhanced through market-friendly safety nets so they can be included in the marketing process."

Sources of Fertilizer Raw Materials Affect Prices

"Prices of phosphate fertilizers rose more steeply than the price of nitrogen-based urea because production sources are more limited," Bumb says. Most of the world's phosphate fertilizers are produced in the United States, Morocco, and along the Baltic Sea. Canada produces 70% of the world's muriate of potash. But plants to manufacture urea, for which natural gas is the main raw material resource, are dispersed worldwide. The world is currently short of urea, but global production may increase because at least six large new urea plants are projected to open in 2008: two in Iran and one each in Egypt, Nigeria, Oman, and Russia.

Corn for Ethanol

"There was once a food economy and an energy economy—but the boom in biofuels is now merging the two," says Phil Humphres, IFDC Senior Specialist–Engineering.

In the United States, 70% of corn production has traditionally been used as animal feed, Humphres says. But 18% to 20% of the 2007 U.S. corn crop was used for ethanol, driving corn prices up by 70%. In 2008, 25% of U.S. corn is projected to go into ethanol.

U.S. corn production in 2007 was 13.1 billion bushels (333 million tons) according to the U.S. Department of Agriculture (USDA)—24% more than in 2006 and the largest U.S. corn harvest since 1933.

But the world cereal production decreased from 2.05 billion tons in 2005/06 to 2.01 billion tons in 2006/07, partly because drought limited Australia's wheat crop. And the world's cereal inventory has dropped to its lowest level in the past 20 years—from 471 million to 428 million tons in the same period, according to the UN Food and Agriculture Organization (FAO).

In other words, world cereal production decreased by about 2% in the past year—but cereal reserves decreased by more than 9%.

Humphres adds, "Prices of products that use corn are rising, and much of the cost will be passed to consumers." Protest riots broke out in Mexico in 2007 after a doubling of the price of tortillas, which are made mostly from corn imported from the United States.

"In the United States, the government subsidizes ethanol by 51 cents a gallon [3.8 liters]," Humphres says. "Large companies are contracting corn from farmers who apply more fertilizer to maximize production.

"But if all U.S. corn production were converted to ethanol, it would supply only 27% of the United States' current transportation fuel demand."

Only meeting the U.S. mandate for biofuel production would require a 60% increase in U.S. land planted to corn, according to the International Food Policy Research Institute.

Brazil's success in use of ethanol from sugarcane is well-known. Dennis Avery, Director of the Center for Global Food Issues at the Hudson Institute, U.S.A., points out that Brazilian sugarcane yields 3.6 units of energy per unit of energy invested. Corn yields only 1.2 units.

Biofuel, Food Security, and the Environment

Two articles published in the February 7, 2008, edition of the prestigious journal Science indicate that subsidized biofuel production may actually increase global warming. The main reason is that farmers are responding to higher prices by burning and plowing huge areas of forest and grassland to convert them to cropland. That not only releases more greenhouse gases but also deprives the earth of natural "sponges" that absorb carbon emissions.

Lead authors of the studies are Timothy Searchinger of Princeton University and Joseph Fargione of The Nature Conservancy, U.S.A.

Searchinger wrote that "…corn-based ethanol, instead of producing a 20% savings, nearly doubles greenhouse emissions over 30 years…"

Simultaneously, farmers in North America are growing corn on land previously planted to soybeans. Brazil is capitalizing on the soybean demand by clearing vast areas of forest and savannas to grow soybeans.

Competition for Natural Gas

Humphres points out that competition for the world's natural gas resources is growing. "Production of 1 ton of ammonia requires about 30 to 33 million Btu of natural gas—about 90% of the raw material cost," he says. Much of the world's huge reserves of gas is "flared" or burned off and wasted, but natural gas is also the main raw resource to produce ammonia production for nitrogen fertilizer.

But the natural gas is increasingly being liquefied and shipped abroad in huge tankers as liquid natural gas—which now accounts for about 22% of global energy use.

“One hundred eighty-seven vessels are currently shipping LNG worldwide,” Humphres says. “Another 130 tankers are on order. Construction capacity is 40 vessels per year, so there is now a 3-year backlog.”

Converting Energy to Food Security

“Although the production of fertilizer is energy intensive, the benefits of using energy to enhance food security through fertilizer manufacture and use are enormous,” Bumb says. “Every 1 million Btu of energy use [1] in the fertilizer sector produces an additional 218 kg of grain—enough to provide the minimum caloric intake for one person for a year.

“Thus, converting energy into food security through fertilizer and associated inputs is probably the world’s most cost-effective and humane alternative for use of energy resources.”

By 2020, energy used for fertilizer production and distribution is projected to increase to 8,494 trillion Btu, Bumb adds. “But even then, energy consumed in the fertilizer sector will remain less than 2% of global energy consumption—far less than what people will use driving personal cars.”

Need to Improve Fertilizer Use Efficiency

“The sharp rise in fertilizer prices emphasizes the need for more research to improve the efficiency of fertilizer use,” says Dr. Amit Roy, IFDC President and Chief Executive Officer.

“For example, most rice farmers in Asia broadcast urea directly into the floodwater,” Roy says. “But only one bag in three is used by the plants. The rest is lost to the air and water.”

The use of urea deep placement (UDP)—inserting large urea briquettes into the rice root zone after transplanting—can increase rice yields by 25% while using less than 50% as much urea as before. More than 550,000 farmers in Bangladesh now use UDP. The Government of Bangladesh is expanding UDP use to another 1.6 million Bangladeshi farm families on almost 1 million hectares. IFDC has also introduced UDP technology to Cambodia, Vietnam, Nepal, Nigeria, Mali, Togo, and Malawi.

“IFDC has also pioneered in the development of integrated soil fertility management, or ISFM, as a tool to improve the efficiency—and thus the profitability—of fertilizer use for smallholder farmers in Sub-Saharan Africa,” says Dr. Henk Breman, IFDC Expert Adviser, Environment and Agronomy, based in Rwanda.

In ISFM both organic and inorganic sources of plant nutrients, including mineral fertilizers, crop residue, phosphate rock, and lime, are combined as soil amendments to produce higher yields. ISFM has improved soil fertility for 150,000 farmers in West Africa and is being expanded to reach 1 million farm families or 10 million people.

“IFDC has an obligation to continue to help farmers, worldwide, get higher yields with less fertilizer,” Roy says.

###

[1] The equivalent of the energy used to drive from Washington, D.C. to New York City in a family car that averages 25 miles per gallon [40 km per 3.4 liter] of gasoline.