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Impacts from the War in Ukraine on Fertilizer Prices

I have recently provided some articles for this newsletter addressing the increasing fertilizer prices that U.S. agricultural communities have been experiencing (1 December 2021 and 8 February 2022). The situation continues to change following the Russian invasion of Ukraine, which is making things even more difficult and driving fertilizer prices even higher.

Fertilizer prices have more than doubled in the past year for most materials commonly used in production agriculture. Fertilizer prices have been increasing primarily as a function of higher natural gas prices, high global demand, and low inventories. In addition, supply chain disruptions have served to further complicate the situation. In response, the USDA has announced plans for a $250M investment to support innovative American-made fertilizer to give US farmers more choices in the marketplace (USDA Press Release No. 0060.22). That will be an interesting program to watch.

Now, with the war in Ukraine, the resultant sanctions, and global disruptions; the Russian government has restricted fertilizer exports. This is a major problem since Russia is a major low-cost exporter of every type of crop nutrient, particularly of nitrogen (N), phosphorus (P), and potassium (K). Russia is the second-largest producer of ammonia, urea, and potash and it is the fifth-largest producer of processed phosphates. Russia provides 23% of the global ammonia for the export market, 14% of urea, 21% for potash, and 10% of the processed phosphates (The Fertilizer Institute; TFI, https://www.tfi.org/).

Currently, Belarus and Russia account for about 15% of all world fertilizer. Europe, including Ukraine, are heavily dependent on both countries for fertilizer inputs. Due to Russia's large

fertilizer production and footprint as a global fertilizer supplier, Russian products being removed from the global marketplace will have an impact on supply.

Large amounts of natural gas are required in the industrial process of N fixation by the Haber-Bosch process that provides the base for most N fertilizers. Russia supplies about one-third of Europe's natural gas supply and many of the globally important N fertilizer plants are in Europe.

Potassium fertilizers are mined from deposits of potassium chloride (KCl, muriate of potash), potassium sulfate (K2SO4), and potassium nitrate (KNO3). Canada is by far the largest producer of K fertilizer worldwide. Russia also has huge deposits of K minerals that are mined for fertilizer production and it ranks second in production and #3 globally in K fertilizer exports (Table 1). In 2020, the U.S. was just below Spain and produced ~ 350,000 metric tons of K fertilizer (The Fertilizer Institute; TFI, https://www.tfi.org/; Potash Investing News, https://investingnews.com/daily/resource-investing/agriculture-investing/potash-investing/top-potash-countries-by-production/).

Nation	Metric Tons of K fertilizer
Canada	14M
Russia	7.6M
Belarus	7.3M
China	5M
Germany	3M
Israel	2M
Jordan	1.5M
Chile	900K
Spain	470K

Table 1. Top countries in K fertilizer production, 2020. U.S. Geological Survey

The U.S. has a robust fertilizer industry but prices for our products are driven by global supply and demand factors, and it is important to note that more than 90% of all fertilizer is consumed outside of the U.S. North America imports ~ 20% of its urea N fertilizer (46-0-0) from Russia. Some nations have a much larger exposure to these global fertilizer problems and Brazil tops the

list with the importation of 47% of their K fertilizer supply coming from Russia along with ~ 20% of their urea and 30% of their mono-ammonium phosphate.

Russian exports ~ 14% of the global urea supply and China makes up about 20%. Many experts in the international fertilizer industry are anticipating that China will increase global urea fertilizer exports in 2022 due to the current circumstances but that is not certain at this point.

The fertilizer supply and price situation does not seem likely to improve soon. So, we are going to have to deal with it. Fortunately, we have good methods for managing our crop nutrient needs and the use of fertilizers in our crop production systems. This makes the value of soil testing more important and the use of the various tools we have at our disposal to improve fertilizer use efficiency.

Developing a sound fertilization program begins with a good understanding of actual soil conditions. The collection and analyses of a good (representative) set of soil samples and then relating that information to established guidelines are the first steps toward developing a strong soil fertility and plant nutritional management program for any crop. This is important for the overall agronomic, economic, and environmental efficiency of a crop production system.

To maximize nutrient management efficiency, it is always important to include and consider the **4R concept of plant nutrient management and application**, consisting of:

1. The **Right** fertilizer source at the
2. **Righ**t rate, at the
3. **Right** time and in the
4. **Right** place

The 4R nutrient stewardship approach utilizes the implementation of best management practices (BMPs) that optimize the fertilizer use efficiency by the crop. The primary objective of the 4R approach and BMPs is to match nutrient supply with crop requirements and to minimize nutrient losses from fields. Each case can vary among farms and fields, dependent on local soil and climatic conditions, crop, management conditions, and other site-specific factors. Field level management is always important and it will be increasingly critical with high fertilizer prices.

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