



The Change in Fertilizer Prices Due to the Russo-Ukraine War

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Abstract: This article examines the significant changes in fertilizer prices due to the Russo-Ukrainian war and its broader economic implications. Historically, crisis cycles have periodically reshaped economic conditions, disrupting standard processes such as currency exchange rates and trade balances. The Russo-Ukrainian conflict escalated pre-existing tensions from the 2014 Crimea annexation and further complicated supply chain issues exacerbated by the COVID-19 pandemic. This article explores the correlation between natural gas prices and key agricultural inputs, highlighting how energy prices influence fertilizer costs and food prices. The analysis covers the impact of the conflict on global fertilizer markets, specifically focusing on nitrogen-based fertilizers, the strategic shifts in European supply chains, and food security in Africa. Additionally, the article discusses geopolitical maneuvers such as the Black Sea Grain Initiative and their effects on food security and agricultural productivity. The findings underline the intertwined nature of energy, agriculture, and geopolitical stability, emphasizing the need for adaptive strategies in response to such crises.

Keywords: Russo-Ukrainian war, economic impact, food crisis, fertilizer prices, natural gas, grain deal, geopolitical stability.

Introduction

In 2014, the Russian military entered the Crimean Peninsula and called a referendum to determine its status. The vote favored joining the Russian Federation,

but very few countries recognize Russia's claim on the peninsula. In the following years, several blackouts¹ occurred, the most notable being in 2015, when 225,000 households were cut off from electricity. Cyberattacks likely caused these blackouts and were possibly part of the preparation for the eventual invasion in 2022.

After Russian forces took control of Crimea, a series of sanctions by the European Union followed, including a ban on dual-use products and financial instruments that could be used to supply the Russian Army. However, like most conflicts throughout history, this one has deeper roots.² The successor states created after the disintegration of the Soviet Union failed to become fully independent of Russian influence. One can also observe the extent of Russia's "sphere of interests"³ in later conflicts.

Russia has always sought to maintain so-called buffer zones⁴ along its borders to separate itself from the West. This principle has shaped the policies of opposing power groups. Since the Second World War, the energy issue has been a sensitive and crucial matter in Europe, and the network built during the Cold War remains a vital component of supply chains. Trade and production competition are merely means to the end of establishing power relations and constructing a security system.

The COVID-19 pandemic influenced these regional processes to such an extent that the already existing faultlines that characterized the region were temporarily overshadowed after managing the pandemic became the primary focus in the information space. However, in the recovery phase, attempts to assert these interests resurfaced with renewed vigor, initially in peripheral areas, such as the six-week war in Nagorno-Karabakh.

The U.S. withdrawal from Afghanistan cannot be neglected when examining the evolution of the balance of power in the created vacuum, which Russia quickly moved to fill. Over the last decade, the question of where to draw Europe's eastern border appeared frequently, alongside Russia's consistent efforts to avoid having a common border with NATO member states. This tension is evident in Ukraine's sharp criticisms of the West during negotiations over potential

¹ Tamás Kun, "Critical Infrastructures: The Bottleneck of Societal Security," *National Security Review: Scientific Periodical of the Military National Security Service* 5, no. 1 (2019): 56-65, 61.

² János Besenyő, "Barry Buzan's Securitization Theory and the Case of Iraqi Kurdish Military Action Against ISIS in 2014," *Journal of Security and Sustainability Issues* 8, no. 3 (2019): 295-306, 299.

³ Robert E. Berls Jr., "Strengthening Russia's Influence in International Affairs, Part II: Russia and Its Neighbors: A Sphere of Influence or a Declining Relationship?" *Nuclear Threat Initiative*, July 13, 2021, accessed November 28, 2023, <https://www.nti.org/analysis/articles/strengthening-russias-influence-in-international-affairs-part-ii-russia-and-its-neighbors-a-sphere-of-influence-or-a-declining-relationship/>.

⁴ Boris Toucas, "Russia's Design in The Black Sea: Extending the Buffer Zone," *Center for Strategic & International Studies*, June 28, 2017, accessed November 28, 2023, <https://www.csis.org/analysis/russias-design-black-sea-extending-buffer-zone>.

NATO membership. These are the so-called “red lines”⁵ in the debate, which anticipated a possible Russian invasion soon afterward. Even trade connections can be used as a weapon,⁶ as illustrated by the year-long Black Sea Initiative between July 2022 and July 2023, which provided a valuable lesson in modern-day conflicts.

This article aims to provide an overview of the changing trends over the past decades and the impact of the Russo-Ukrainian war on fertilizer prices and related food production.

Correlation between the Prices of Natural Gas and Key Fodder Crops and Fertilizers

Correlation is generally used to present the linear relationship between two variables. In this case, the data shows how certain basic crops and fertilizer types have been affected by the price change of natural gas in Europe. Over the long term, there is a close one-way relationship for the price movements of each examined product type. In the 12 months before the war, the relationship between price movements was especially close for fertilizers, while corn (a key fodder crop) exhibited a weak price trend in the opposite direction (see Table 1). In the last six months (since the beginning of the war in Ukraine), there has been a moderately strong to strong opposite price trend between corn and nitrogen-based fertilizers.

The agriculture industry relies on energy for various purposes. Electricity and fuel are used directly for irrigation, manufacturing, processing, and packaging. Mineral fertilizers, on the other hand, boost crop yields and represent an indirect form of energy demand. Natural gas is crucial in producing urea and ammonia for nitrogen-based fertilizers, covering 75-90% of manufacturing costs. Therefore, higher energy prices almost always lead to higher fertilizer costs (see Figure 1), which in turn leads to higher food prices.⁷

The Russo-Ukrainian war has exacerbated concerns about natural gas and nitrogen fertilizers. While Europe has declared a goal of reducing its reliance on Russian fossil fuels, the Russian Federation and Iran hold over one-third of the world’s total natural gas reserves. Furthermore, transitioning away from Russian

⁵ Andrew Roth, “Russia Will Act if NATO Countries Cross Ukraine ‘Red Lines’, Putin Says,” *The Guardian*, November 30, 2021, accessed November 29, 2023, <https://www.theguardian.com/world/2021/nov/30/russia-will-act-if-nato-countries-cross-ukraine-red-lines-putin-says>.

⁶ Mark Galeotti, *The Weaponisation of Everything: A Field Guide to the New Way of War* (New Haven, Connecticut: Yale University Press, 2022), 69.

⁷ Naimat Chopra, “Fuel, Food, and Fertilizer: The Interwoven Impacts of the Russia-Ukraine War,” *Kleinman Center for Energy Policy*, May 5, 2023, accessed November 26, 2023, <https://kleinmanenergy.upenn.edu/news-insights/fuel-food-and-fertilizer-the-interwoven-impacts-of-the-russia-ukraine-war/>.

Table 1. Correlation of Natural Gas Price, Europe.

Period	Correlation of natural gas price, Europe ** to					
	Maize	Urea	Phosphate	DAP	TSP	Potassium chloride
<i>All</i>	0.7424	0.8281	0.7181	0.7619	0.7618	0.8537
<i>Last 8 months</i>	0.5839	0.6251	-0.2905	0.6743	0.7153	0.6484
<i>Last 12 months</i>	0.5180	0.5903	-0.2273	0.6763	0.7174	0.6429
<i>Last 6 months</i>	0.5866	0.6879	-0.4148	0.6812	0.7249	0.6567
<i>Last 12 months before March 2022</i>	-0.2724	0.9061	0.9258	0.9307	0.9186	0.3655
<i>Last 5 years before March 2022</i>	0.6513	0.9410	0.9289	0.8773	0.8978	0.1489

Source: World Bank Commodity Price Data (The Pink Sheet)

DAP: Diammonium phosphate; TSP: Triple Super Phosphate

Data collected: October 23, 2023.

supply will eventually result in higher prices across Europe. Consequently, European production of nitrogen fertilizers will face a disadvantage compared to the United States, where gas reserves are more plentiful and cheaper.

Additionally, Russia is a significant producer of fertilizer ingredients, such as nitrogen, and has announced plans to restrict its exports due to sanctions. This will lead to disruptions in the nitrogen market. Russia's ammonia exports make up 23 % of the global market; its absence would constitute a significant loss, forcing dependent countries to find new sources of supply. For example, Brazil imports 95 % of its nitrogen fertilizers, with 21 % coming from Russia.⁸ However, as

⁸ Gary Schnitkey et al., "Nitrogen Fertilizer Prices and Supply in Light of the Ukraine-Russia Conflict," *farmdoc daily* (12):45, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, April 5, 2022, accessed November 26, 2023, <https://farmdocdaily.illinois.edu/2022/04/nitrogen-fertilizer-prices-and-supply-in-light-of-the-ukraine-russia-conflict.html>.

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a member of the BRICS alliance, Brazil is less likely to be affected by the loss of Russian exports.

European economies, on the other hand, must redesign their supply chains. In the future, they will likely increase their reliance on the United States. However, the increase in logistics costs will need to be compensated for elsewhere.

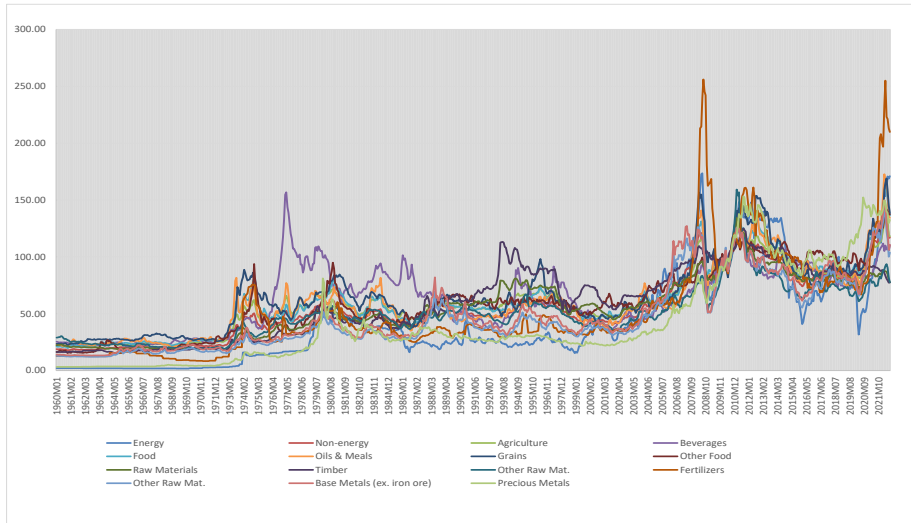


Figure 1: Monthly Indices 1960M01-2022M08.

(Source: World Bank Commodity Price Data).

The Yom Kippur War was the first event that initiated significant changes in the development of the energy sector and related areas (see Figure 1). This conflict later resulted in the development of new equilibrium situations and arrangements in the global energy market. Although the trend already indicated serious problems⁹ in the sector at the beginning of 1973, the conflict that developed in the latter half of the year further exacerbated these issues. Opposing interest groups used economic instruments against each other in a punitive manner to put pressure on their adversaries. A similar strategy can be seen in Russia’s approach, using its energy dominance to pressure Europe.¹⁰

The Russo-Ukrainian war mirrors this situation. Following the condemnation of the Russian invasion, the United States and the EU promptly enacted sanctions aimed at limiting Russian activities. The Hamas-Israel conflict in the Gaza Strip

⁹ Henry A. Kissinger, “The Future Role of the IEA,” Speech for the 35th Anniversary of the International Energy Agency, Paris, France, October 14, 2009, <https://www.henryakissinger.com/speeches/the-future-role-of-the-ia/>.

¹⁰ Michael Carnegie LaBelle, “Energy as a Weapon of War: Lessons from 50 Years of Energy Interdependence,” *Global Policy* 14, no. 3 (June 2023): 531-547, 533-534, <https://doi.org/10.1111/1758-5899.13235>.

also stirs fears reminiscent of the oil crisis in the 1970s, highlighting ongoing struggles for regional control.

Russia's invasion of Ukraine has caused fertilizer prices to soar just as the world began planting crops critical to global supplies. As the world's largest exporter of fertilizers, Russia's conflict with Ukraine has disrupted supplies and driven up natural gas prices, a key ingredient in fertilizer production. Western sanctions, including those on Russian banks, could further limit exports by restricting financing.

Since the invasion began on February 24, urea fertilizer prices have jumped by 32 %, while diammonium phosphate (DAP) futures have risen by 13 %.¹¹ Fertilizers are essential for food production, especially for staple grains. Rising prices could impact food supplies if farmers reduce their use of fertilizers due to higher costs, leading to lower yields. On average, grain yields are higher on fertilized land, but farmers in low- and lower-middle-income countries are more likely to use less fertilizer, resulting in reduced crops.¹²

Arndt and colleagues found that household consumption falls in all 19 countries studied, including those benefiting modestly from natural gas and crude oil exports. In contrast to what is observed in terms of GDP, rising food prices are an important factor influencing consumption in most countries. Rural populations also suffer from fertilizer shocks, directly affecting agricultural productivity and incomes. Conversely, fuel prices have a stronger negative impact on non-agricultural sectors and urban household consumption.¹³

After Russia invaded Ukraine in February 2022, several economies, including the EU and the US, imposed sanctions on Russia and Belarus, key suppliers of fertilizers. These sanctions included restrictions on food and fertilizer sectors to avoid negative impacts on global food security. These omissions allowed Russia to continue exporting fertilizers, but Belarus experienced a more than 50 % drop in potash fertilizer exports due to restrictions on using EU territories for transit. In particular, Lithuania stopped using its railway network to transport Belarusian potash to the port of Klaipėda, through which 90 % of Belarusian exports typically pass.¹⁴

¹¹ "Russia-Ukraine Crisis Ignites Fertilizer Prices at Critical Time for World Crops," *Gro Intelligence*, March 4, 2022, accessed November 23, 2023, <https://www.gro-intelligence.com/insights/russia-ukraine-crisis-ignites-fertilizer-prices-at-critical-time-for-world-crops>.

¹² Jennifer Kee, Lila Cardell, and Yacob Abrehe Zereyesus, "Global Fertilizer Market Challenged by Russia's Invasion of Ukraine," *Economic Research Service* (U.S. Department of Agriculture), September 18, 2023, accessed November 23, 2023, <https://www.ers.usda.gov/amber-waves/2023/september/global-fertilizer-market-challenged-by-russia-s-invasion-of-ukraine/>.

¹³ Channing Arndt et al., "The Ukraine War and Rising Commodity Prices: Implications for Developing Countries," *Global Food Security* 36, 100680 (March 2023): 1-9, 7, <https://doi.org/10.1016/j.gfs.2023.100680>.

¹⁴ John Baffes and Wee Chian Koh, "Fertilizer Prices Ease but Affordability and Availability Issues Linger," *World Bank Blogs*, January 5, 2023, accessed November 25, 2023,

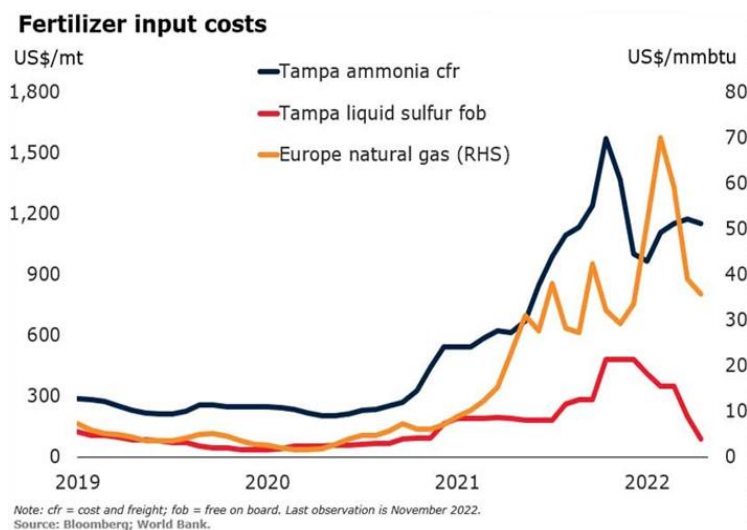


Figure 2: Fertilizer Input Costs (Source: Bloomberg, World Bank).

As the European gas market prices rose (see Figure 2), fertilizer prices followed the growing trend. During the pandemic, supply chain disruptions and changes in consumer behavior influenced demand in the energy market.¹⁵ Various lockdown measures, including border restrictions and flying bans, significantly impacted these sectors.

The movement of price indices generally follows a typical pattern, with certain major events having distinct impacts. Notably, the World Trade Center attack on September 11, 2001, did not significantly affect these indices. By 2010, prices had doubled compared to 2000, and the 2008 financial crisis led to a rapid rise in prices, which then returned to pre-crisis levels. A notable spike occurred in 2011, likely triggered by rising energy prices, followed by a gradual decrease during which energy prices diverged from the trend of other goods.

The current price trends began in the summer of 2020 (see Figure 3), showing a continuous increase. Fertilizer prices, in particular, have spiked around major events, such as the 2008 financial crisis and the post-pandemic years.

Due to the redesigned energy policy of the European Union and the energy procurement opportunities arising from the Russo-Ukrainian war, fierce competition between the euro and the dollar has begun. Even during the pandemic, the

<https://blogs.worldbank.org/en/opendata/fertilizer-prices-ease-affordability-and-availability-issues-linger>.

¹⁵ Suzanne Jenkins, "How the Russia-Ukraine War Helped Fuel Record Fertilizer Prices," *Federal Reserve Bank of St. Louis*, October 4, 2022, <https://www.stlouisfed.org/publications/regional-economist/2022/oct/russia-ukraine-war-record-fertilizer-prices>.

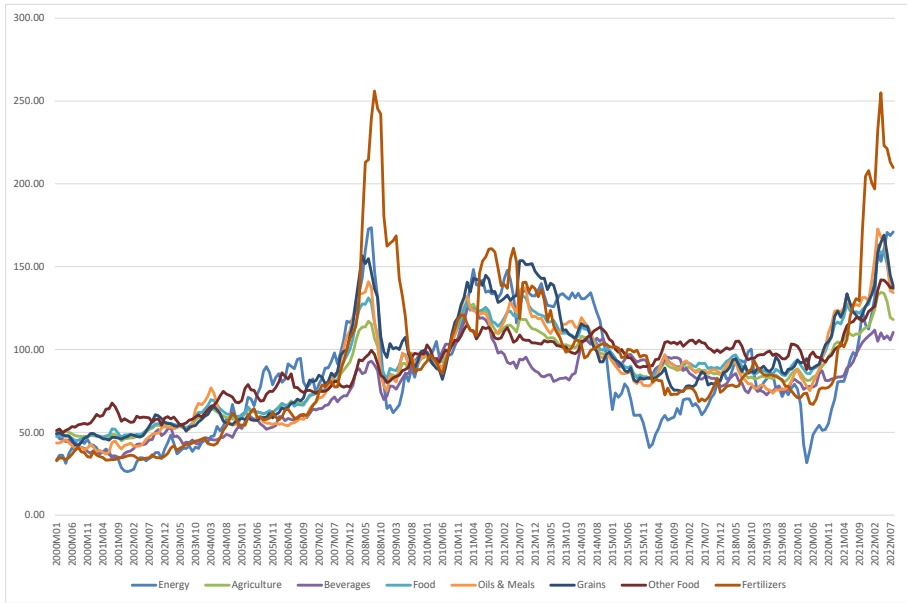


Figure 3: Monthly indices 2000M01-2022M08 (Source: World Bank Commodity Price Data (The Pink Sheet)).

United States achieved import independence and took over the lead role among the world’s oil exporters. It also plays a significant role in natural gas production. The liquefied natural gas (LNG) contracts concluded with the EU reached new records¹⁶ in 2021, providing a stable foundation for realizing its goals.

During the dotcom crisis, the rise of the dollar was typical, but after 9/11, the dollar began to weaken – a trend lasting until 2007. Volatile exchange rate movements were common within the 1.2-1.5 range (see Figure 4) around a generally strengthening trend. In 2013-2014, there was a rapid and definite rise in the dollar’s value, after which it stabilized at an exchange rate of around 1.1 EUR/USD. In 2016-2017, the dollar weakened again before another period of strengthening. Uncertainty around the presidential election and the transfer of power, as well as the impact of COVID-19, contributed to the dollar’s temporary weakening. The latest strengthening of the dollar’s exchange rate, which began at the turn of 2020-2021, appears to be a more permanent trend.

¹⁶ European Commission, “EU-US LNG TRADE: US Liquefied Natural Gas (LNG) Has the Potential to Help Match EU Gas Needs,” February 2, 2022, https://energy.ec.europa.eu/system/files/2022-02/EU-US_LNG_2022_2.pdf.



Figure 4: Development of the EUR-USD Exchange Rate (1999-2022).
(Source: macrotrends.net)



Figure 5: Development of the EUR-USD exchange rate (2012-2022).
(Source: macrotrends.net)

In 2022, the euro weakened by 17 % against the dollar over the year, falling below parity in July for the first time in two decades.¹⁷ However, lower gas prices and positive growth dynamics in the region were expected to support the euro's strength in 2023. The TTF (Title Transfer Facility) gas price, Europe's main indicator of gas prices, fell to pre-invasion lows as the continent experienced its warmest weather on record. This sharp drop in gas and electricity prices provided substantial support for the economy, allowing the region to avoid the expected severe recession.

Energy dependence and geopolitical risks will continue to be significant themes in the region in the coming years, and the growing risks of a US recession remain a threat to increasing trade. Additionally, the Fed is expected to continue raising rates, which could further tighten ECB policy.¹⁸

Though the USD was strong during the first year of the war, the EUR managed to climb back (see Figure 5) to a safe zone and remained consistent. Over the previous decade, several crises close to Europe have caused the USD to strengthen, such as the European Migration Crisis in 2015, which took a heavy toll on the EU's economy.¹⁹

Grain Agreement with Russia

On July 27, 2022, the Black Sea Grain Initiative, brokered by the UN and Türkiye with the Russian Federation, was formed. This initiative allowed the shipment of grain, related foodstuffs, and fertilizers from Ukraine.²⁰ The resumption of Ukrainian grain exports through the Black Sea amid the ongoing war is a "ray of hope" in a world that desperately needs it, stated UN Secretary-General Antonio Guterres at a signing ceremony on July 27 in Istanbul, Turkey. The UN plan aimed to facilitate the export of Russian food and fertilizers to global markets, helping stabilize rising food prices worldwide and preventing millions of people from starvation.

The initiative specifically allowed the export of commercial food products and fertilizers (including ammonia) from three key Ukrainian ports on the Black Sea

¹⁷ Ben King, "Euro Falls below Dollar for First Time in 20 Years," *BBC*, July 13, 2022, accessed November 29, 2023, <https://www.bbc.com/news/business-62153251>.

¹⁸ "Currency Volatility: Will a Strong US Dollar Return?" *J.P.Morgan*, February 3, 2023, accessed November 26, 2023, <https://www.jpmorgan.com/insights/global-research/currencies/currency-volatility-dollar-strength#euro>.

¹⁹ János Besenyő, "Fences and Border Protection: The Question of Establishing Technical Barriers in Europe," *AARMS – Academic and Applied Research in Military and Public Management Science* 16, no. 1 (2017): 77-87, 79-80, <https://doi.org/10.32565/aarms.2017.1.7>.

²⁰ UN Office for the Coordination of Humanitarian Affairs (UN OCHA), "Joint Coordination Centre Opens in Istanbul to Facilitate Safe Export of Commercial Foodstuffs and Fertilizers from Ukrainian Ports," *reliefweb*, July 27, 2022, accessed September 11, 2023, <https://reliefweb.int/report/turkiye/joint-coordination-centre-opens-istanbul-facilitate-safe-export-commercial-foodstuffs-and-fertilizers-ukrainian-ports>.

– Odesa, Chernomorsk, and Yuzhny/Pivdennyi. A Joint Coordination Center (JCC) was established to monitor the implementation of the initiative. The JCC, located in Istanbul, comprises representatives from Russia, Turkey, Ukraine, and the United Nations, with the UN also serving as the Center’s secretariat.

Ukrainian ships guided cargo vessels into international waters of the Black Sea, avoiding mined areas. The ships then traveled to Istanbul along the agreed maritime humanitarian corridor. Ships entering and leaving Ukrainian ports were inspected by JCC teams, which included Russian, Turkish, Ukrainian, and UN inspectors.

In April 2022, the UN Secretary-General met with Russian President Vladimir Putin and Ukrainian President Volodymyr Zelenskyy to propose this plan. Alongside these negotiations, two UN working groups were created – one on transporting Ukrainian grain across the Black Sea, led by UN humanitarian chief and OCHA head Martin Griffiths, and the other on facilitating the delivery of Russian food and fertilizer exports, led by Rebeca Grynspan, Secretary-General of the United Nations Trade and Development Organization (UNCTAD).

The agreement was an intermediate solution for temporarily managing higher-level problems, as the participating parties had mutual interests. However, it did not provide a stable, long-term solution to alleviate the tension in the region. Thus, the initiative was not renewed beyond its third term, which ended on July 17, 2023.²¹

Donations towards African Countries

The African Union has called an emergency meeting to restore the UN-brokered grain deal that allowed Ukraine to export millions of tons of grain, which had been cut off on Russia’s behalf. “The problem of grain and fertilizer concerns everyone,” stated Comoros President Azali Assoumani, head of the 55-member African Union, in an interview with Russian state television channel RIA Novosti. He was speaking from St. Petersburg, where Russian President Vladimir Putin held a summit with African leaders.²²

The UN World Food Program (WFP), the world’s largest humanitarian organization, also shipped wheat from Black Sea ports. By July 2023, 80 % of the program’s grain reserves were purchased from Ukraine, up from 50 % before the war. During the initiative’s implementation, more than 725,000 tons of wheat were shipped from Ukrainian ports to countries including Ethiopia, Yemen, Afghanistan, Sudan, Somalia, Kenya, and Djibouti. The EU, a major producer and exporter of wheat, was estimated to have exported 31 million tons of wheat in

²¹ United Nations, “Black Sea Grain Initiative Joint Coordination Centre,” 2023, accessed November 26, 2023, <https://www.un.org/en/black-sea-grain-initiative>.

²² Nicolas Camut, “African Union Calls on Russia to Reinstate Ukrainian Grain Deal,” *Politico*, July 23, 2023, accessed September 11, 2023, <https://www.politico.eu/article/african-union-calls-to-reinstate-the-ukrainian-grain-deal/>.

the 2022/23 marketing year to target countries such as Algeria, Morocco, Egypt, Pakistan, and Nigeria.²³

In July, at a summit of African leaders, Putin promised free grain to six countries²⁴ shortly after Moscow withdrew from the agreement that allowed Ukraine to ship grain from its Black Sea ports despite the war with Russia. However, Putin argued that he could not provide for the countries that most urgently needed help, noting that Russia exported about 60 million tons of grain last year. UN chief Antonio Guterres called promises of free grain “a handful of donations.” According to Kyiv, after withdrawing from the agreement, Russia repeatedly bombed Ukrainian ports and grain warehouses, destroying hundreds of thousands of tons of grain. Yet, Ukraine still managed to transport 4.4 million tons of cargo, including 3.2 million tons of grain, through a new sea corridor created in August 2023.²⁵

“By the end of the year, we plan to transfer another 200,000 tons of wheat to six African countries: Somalia, the Central African Republic, Burkina Faso, Zimbabwe, Mali, and Eritrea,” said Alexey Polishchuk, Russian Foreign Ministry Director of the second CIS department. He also mentioned that Moscow is working with the UN World Food Program on the donation and has already delivered 20,000 tons of fertilizer to Malawi and 34,000 tons to Kenya. Additionally, 23,000 tons of fertilizers will be delivered to Zimbabwe, 34,000 tons to Nigeria, and 55,000 tons to Sri Lanka.²⁶ A repeated question in accompanying debates is what percentage of the delivered quantities, according to the grain agreement, actually reaches the destination countries in greatest need to avoid starvation.

The impact of the Russo-Ukrainian war can also be measured in greenhouse emissions and food availability. The amount of available food is decreasing in most low-income countries; however, the threat is not present on a global level.²⁷ The war has also destabilized global agricultural markets, triggering food price increases. The attacks on the port of Odesa and the mining operations in

²³ European Council, “Infographics – Ukrainian Grain Exports Explained,” October 11, 2023, accessed November 26, 2023, <https://www.consilium.europa.eu/en/infographics/ukrainian-grain-exports-explained/>.

²⁴ Jim Heintz, Edith M. Lederer, Chris Megerian, and Rebecca Santana, “Putin Promises No-cost Russian Grain Shipments to 6 African Countries,” *Associated Press*, July 27, 2023, accessed November 29, 2023, <https://apnews.com/article/russia-putin-africa-summit-food-crisis-de317f5075d4b1719ade457f4eabfb82>.

²⁵ Reuters, “Russia Says First Free Grain Shipments to Africa Are on Their Way,” *Reuters*, November 17, 2023, accessed November 29, 2023, <https://www.reuters.com/markets/commodities/russia-begins-supplying-free-grain-african-countries-agriculture-minister-2023-11-17>.

²⁶ CGTN, “Russia to Donate More Wheat to Africa by Year-end,” *CGTN*, November 3, 2023, accessed November 29, 2023, <https://newsaf.cgtn.com/news/2023-11-03/Russia-to-donate-more-wheat-to-Africa-by-year-end-1opD4tc93Wg/index.html>.

²⁷ Hans van Meijl et al. “The Russia-Ukraine War Decreases Food Affordability but Could Reduce Global Greenhouse Gas Emissions,” *Communications Earth & Environment* 5, no. 59 (2024): 1-12, 5-8, <https://doi.org/10.1038/s43247-024-01208-x>.

the Black Sea resulted in a price increase in grain shipments.²⁸ By August 2023, President Vladimir Putin declared Moscow's intention to take Ukraine's place in grain supplies to African nations.²⁹

Conclusion

The swings experienced during different crisis cycles tend to be periodic, often returning to a state of rest over time. The shock effects arising from seemingly unexpected societal situations often have a well-established history. In other words, a path leading to them, of which, in everyday life, we usually experience only the culmination.

In the case of the Russo-Ukrainian war, the perceived fear has become a reality in 2022, as the possibility of armed conflict has been in the air with the clashes in the Donbas region since 2014. The change in fertilizer prices has been dependent on issues affecting the energy sector for many decades, so the current war is only one stage of the ongoing process that determines the solution to problems related to agricultural production and energy supply.

After studying the possibility of a food crisis, it can be summarized that while some results do not indicate the global significance of the war, spillovers and the development of regional conflicts must be taken into consideration in the future. It is also worth noting that in many cases, even though there is an explanation based on practical experience, the geopolitical games and related manipulative activities should not be neglected.

Disclaimer

The views expressed are solely those of the authors and do not represent official views of the PfP Consortium of Defense Academies and Security Studies Institutes, participating organizations, or the Consortium's editors.

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²⁸ Miguel Carriquiry, Jerome Dumortier, and Amani Elobeid, "Trade Scenarios Compensating for Halted Wheat and Maize Exports from Russia and Ukraine Increase Carbon Emissions without Easing Food Insecurity," *Nature Food* 3 (October 2022): 847-850, <https://doi.org/10.1038/s43016-022-00600-0>.

²⁹ Caitlin Welsh and Joseph Glauber, "Food as the 'Silent Weapon': Russia's Gains and Ukraine's Losses," *Center for Strategic & International Studies*, February 29, 2024, <https://www.csis.org/analysis/food-silent-weapon-russias-gains-and-ukraines-losses>.

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