



Global Prospective of Agriculture under War Conflict: Impacts, and Vulnerabilities

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DOI: <https://doi.org/10.5281/zenodo.21066252>

Received on: 28/03/2026

Revised on: 15/04/2026

Accepted: 10/06/2026

Abstract

Agriculture is the backbone of economic growth for most of the developing economies globally and serves as the primary occupation and livelihood for local population. War, a socio-political activity, influences agriculture potentially creating not only economic crisis but also a social health havoc and environmental catastrophe primarily influencing the most vital resources for agriculture which are soil and water, with a number of toxic heavy metals. Not limited to contamination, war also generates the limiting scenarios when it refers to the commodities supporting the agricultural activities worldwide. This research article drives in depth to explain those commodities, their role in agricultural activities and impact of their fluctuation in the cost of agricultural activities in response to the wars in progress in the Middle east between USA, Israel and Iran; and also, the Russia-Ukraine war.

Keywords: Fluctuation of fertilizer cost, Impact of oil on agriculture, heavy metal contamination in soil amidst war.

1. Introduction

Agriculture sector constitutes the backbone of economy of majority of the countries especially when it refers to the developing Nations. Agriculture sector is not an individual entity but relies on a complex network of supporting fields

such as animal husbandry, fisheries, forestry, fertilizers, pesticides, agrochemicals, farm machinery equipment, irrigation systems, transportation services, logistics, warehousing, food processing industries, capital inputs from

banks and cooperative as well as governmental research and development centers (Gejeaand tolesa, 2024). Inflation in the cost of any of the input or supporting field reflects in the increased cost and decreased yield of agriculture output substantially, which can throw a considerable burden on the economy of the country (Kotykova et. al., 2025). Especially in a developing Nation like India, the yield and prices of agriculture produce relies heavily on the cost of fertilizers, fuels, labor, machinery and seeds. Reflection in the prices of agriculture supporting commodities heavily relies on a complex network of global and local factors such as geopolitical events, energy market volatility, supply chain disruptions and government policies. Minute disturbance in any of the factors can lead to a shocking and sudden increase in the prices of the agriculture produces as well as adversely effects the yield (Neyler et. al., 2024).

In view of the currently ongoing US-Israel-Iran war which started around February 28, 2026, a grave threat surrounds the global agriculture sector. As described by the literatures, war is nothing but a frightening situation between Nations pretending to show their strengths which results in deprivation natural resources, environment, economy and population of those Nations (Van Creveld and Morey, 2008). The threat of this war situation not surrounds only the countries fighting, but also expands to the global trade because the Middle Eastern region is among

the largest exporters of crude oil (Matallah, 2025). Also, the import-export of fertilizers and food products is devastatingly affected resulting in the inflation of prices of such commodities globally. As indicated by Fig. 1, the prices of agricultural produce dependon a number of factors shown in the figure. The major impacting factors remain the fertilizer and crude oil and how these factors impact the agricultural production is explained in this article. Also, the impact of fluctuation in these commodities on agricultural production is also highlighted in this research article (Schaubet. Al., 2023).

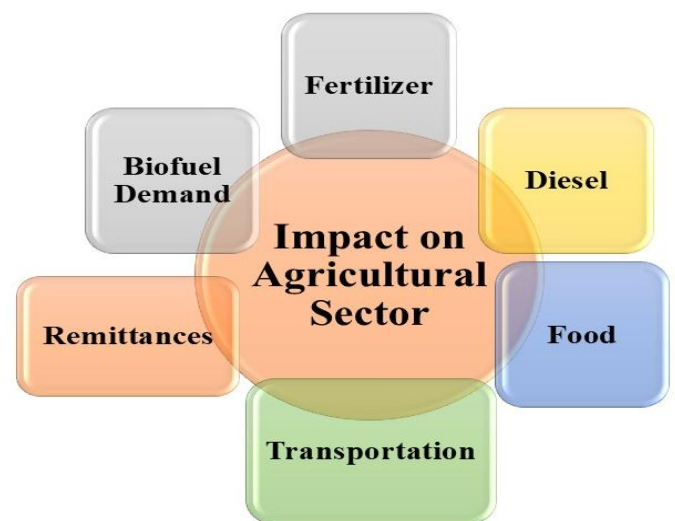


Fig.1. Sectors influencing agricultural production

2. Boom in Cost of Fertilizers

The impact of ongoing Middle East war can be evident on the price crashing of the fertilizers all over the world. The destruction of Strait of Holmuz by Tehran as a result of the retaliation to

the US and Israel attacks have raised the limitations over the trade of fertilizer (Butler et. al., 2026). In response to the Russia Ukraine war China already had stopped the supply of fertilizers globally which raised the prices of the fertilizers even before the Middle East war and with the ongoing Middle East, 30% of the global fertilizer trade hampered impacting the rise in prices of fertilizers crashed over 29% in the last month (China restricts, 2026; The war, 2026). This restricted supply of fertilizers on a global scale could either result in the failure of crop this season or would result in the search in the prices of food commodities all over the world. The crisis has arrived on a time when the crop sowing season is about to begin, the current impact might be mild but in the near future, the impact could be severe. With regard to the Indian subcontinent, it is the time to sow rice crop which requires heavy amount of nitrogen fertilizer. Also, India being second largest importer of fertilizers globally, is in a state of shock amidst the hike in the prices of fertilizers (UN, 2025). As shown in Fig.2, the prices of Middle East granular urea before war were accessed to be \$436 to \$494/MT which raised a sharp peak of \$604 to \$710/MT, while Southeast Asia granular urea prices jumped from \$490-\$498/MT before war to \$750/MT in current time. Also, the hike in the prices of phosphate fertilizer raised from \$746 to \$766/MT before war to \$850/MT amidst the current war situation. Similar impact is faced by United States and Europe where

this is a peak time of planting season and if is expected to hit first planting season in the upcoming months. The impacts are not limited to the prices of fertilizer only, but are also evident on crop prices. The prices of rice in India dropped from about 6% to 10% amidst war (Bhosale, 2026). The Australian wheat exporters gained just \$4/MT amidst the current warcrisis which reflects subdued demand (Lee and thang 2026).

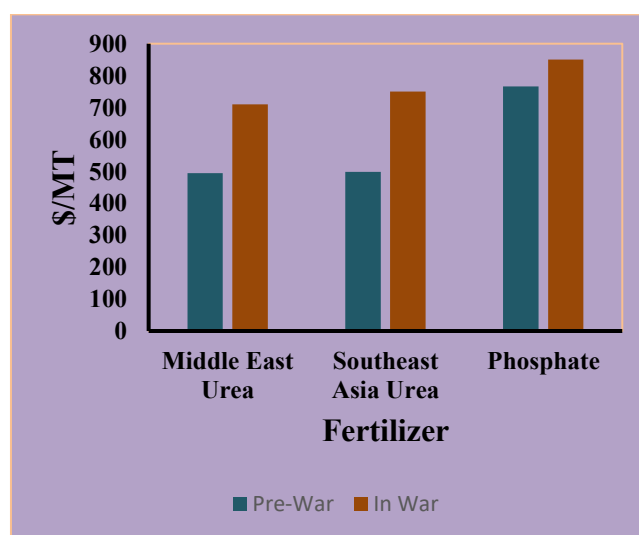


Fig. 2. Rise in the global prices of fertilizers pre and amidst war

3. Rise in Prices of Oil

Diesel is among such commodities, which clearly have vital role in the economy of the country. From farms to industries, working of all the machineries depend on diesel. Diesel is a non-negotiable input for farms and remains the primary source for heavy machinery and irrigation system. Diesel typically accounts for 15-25% of total on-farm production costs. Agriculture not only ends on commercial farms, transportation

and logistics sectors also relies on diesel cost. In the developing economies about 70% transport of goods is executed via road transportation requiring diesel for their functioning. Another sector whose price coincides with the price of diesel are nitrogen-based fertilizers whose production constitute diesel as raw material. In view of the current middle eastern war situation, the hike in the prices of the crude oil as well as diesel is assumed to increase in the upcoming days which emerged the cloud of tensions surround the global economies. A global rise in per litre price of diesel is projected to 3% to 5% snitch to the FAO report. The price of diesel in February 2026 was \$86 per barrel which jumped to \$175.7 per barrel in March 2026 which is the change of approximately 104% while the global average shifted from \$1.05 per litre to \$1.44 per litres of diesel which is a shift of approximately 37%. This rise might impact in the 20% increase in vegetable production cost in the European Union due to fuel and heating oil spills. In South-Asia, a significant yield dropped in rice production due to reduction in the diesel-pump irrigation hours. Grain transport charges in North America amidst the current Middle East war peaked to the most height in the past three years (ET Online, 2026;).

4. Contamination in Soil and Water

War is an activity that leads to the majority of destruction of natural resources especially soil and water. Modern warfare leaves a toxic legacy in the

landscape that can persist for generations. Modern ammunitions are not just kinetic weapons; they are chemical delivery systems. Upon detonation, shells and missiles release a cocktail of heavy metals including Lead (Pb), Antimony (Sb), Copper (Cu), and Nickel (Ni). These heavy metals when come in contact with the surface, the process of pedoturbation starts, which permanently alters the chemical composition of soil through a series of physical, chemical and thermal reaction, and further through leaching contaminates the groundwater. Military operations often lead to drastic shifts in urban land-use dynamics, as rural populations are displaced and agricultural fields are abandoned or repurposed for tactical use (Ghildiyal et. al., 2025). This shift is compounded by the physical degradation of the soil; the use of heavy machinery and explosives can lead to salinity problems and soil compaction. Furthermore, the lack of proper solid waste management in conflict zones particularly in challenging or hilly terrains can lead to the accumulation of hazardous debris that leaches into the soil, long outlasting the active fighting (Kumari et. al., 2025; Tiwari et. al., 2025).

Several examples have been shown by a number of studies carried out in the countries facing war. One of such studies Yashchenko et. al., 2025 showed severely high heavy metal contamination in three key regions of Ukraine namely Dnipropetrovsk (DnD), Sumy (SmD), and Chernihiv (ChD). Dnipropetrovsk (DnD) recorded the highest

contamination due to its pre-existing industrial background with Lead (Pb) reached 3.9 times the MPC, Nickel (Ni) hit 1.8 times, and Manganese (Mn) was 1.4 times the limit. Sumy (SmD) showed high levels of Lead and Nickel when compared to previous levels, while Chernihiv (ChD) presented a lower overall risk compared to the more industrialized regions. Another study by Altahaan and Dobslaw, 2025 provides a critical assessment of groundwater recovery in Mosul between 2022 and 2023, revealing a stark contrast between shallow and deep aquifers in the wake of conflict. The study revealed that the concentration of heavy metals increased in 2023, suggesting that the toxic legacy of the war is still migrating deeper into the earth. According to AAAS, 2025, modern warfare creates a catastrophic and multi-generational "ecological engine" that extends far beyond the immediate human toll, as evidenced by the 83,000 tonnes of heavy metals and industrial toxins released during the 2023 Kakhovka Dam breach which resulted in the severe chemical contamination of soil and groundwater with persistent heavy metals (Pb, Cd, Ni) and explosive residues. This exceedingly stationed the crash onto the agriculture, public health and mostly to the economy of the country (Mirage, 2025).

Conflict often results in the decontamination of subsurface water resources becoming a secondary priority, leading to the leaching of heavy metals or chemicals into shallow aquifers. While hydrological modelling is essential for sustainable

land and water management, its effectiveness is limited in war zones due to destroyed monitoring infrastructure and the inability to collect ground-truth data (Khare et. al., 2026). The high cost of in situ remediation technologies often makes the restoration of contaminated agricultural aquifers economically unfeasible for war-torn nations. Also, the collapse of constitutional laws during conflict often leaves agricultural resources unprotected from illegal dumping or over-exploitation (Khare and Kumar, 2025). This breakdown of order removes the mechanism for public participation in resource management, which is vital for maintaining a healthy aquifer and sustainable farming practices (Kumar and Khare, 2025; Maurya et. al., 2025). Ultimately, the consumption of crops irrigated by contaminated water leads to a measurable negative impact on human health, further destabilizing the agricultural workforce in South-Asian and other global conflict regions (Khare and Kumar, 2025).

5. Conclusion

The impact of modern warfare on agriculture constitutes a "triple crisis" that destabilizes global food security through the volatile interplay of energy markets, economic shifts, and environmental toxicity. While the recent crash in fertilizer prices initially suggested a reduction in input costs, these gains were largely neutralized by a sharp increase in global diesel prices, which has strained irrigation and logistics margins by up to

25%. Compounding this economic pressure is the "insidious" legacy of heavy metal contamination, where munitions and infrastructure destruction—exemplified by the 83,000-tonne toxic release from the Kakhovka Dam breach—have elevated Lead and Nickel levels to nearly 4.0 times the maximum permissible concentrations. This contamination is further evidenced by the progressive degradation of shallow aquifers in post-conflict zones like Mosul, where "delayed mobilization" ensures that toxins continue to leach into the food chain years after active combat ends. Ultimately, the transition to agricultural recovery is hindered by this invisible frontline, requiring that soil remediation and energy-price stabilization be treated as fundamental pillars of international security and post-war reconstruction.

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Cite this Article : Khare, S., Kumar, D., Sharma, K., & Lohani, T. (2026). Prospective of Agriculture under War Conflict: Impacts, and Vulnerabilities. *Indian Journal of Agriculture Humanity and Science*, 2(1), 28–35. <https://doi.org/10.5281/zenodo.21066252>