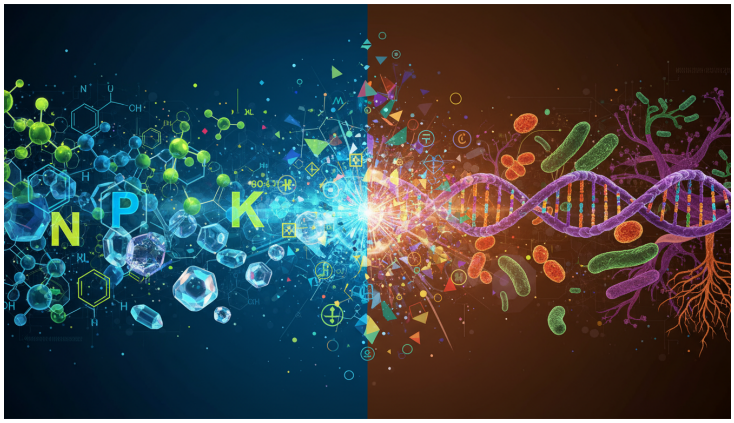
AgroSpectrum ASIA
Envisaging Future | Updating Present

Chemical crunch, biological breakthrough: Rethinking fertiliser strategy in volatile world

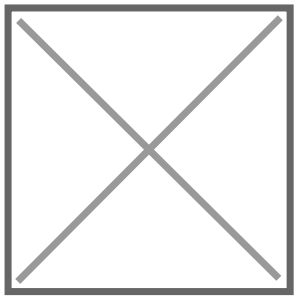
05 November 2025 | News

The 2025 fertiliser upheaval has laid bare the disquieting vulnerabilities of Indiaâ??s nutrient securityâ??an economy shackled to volatile global markets, skewed subsidies, and an unhealthy addiction to artificially cheap urea. What appears as a transient supply disturbance is, in reality, a geopolitical tremor triggered by Chinaâ??s export restrictions, Russiaâ??s selective opportunism, and the capriciousness of global energy prices, all converging to imperil the livelihoods of millions of smallholders. This article therefore discusses how emergency imports and ballooning subsidies merely anaesthetise a deeper malaise while the soil continues to suffer from decades of nutritional imbalance. It scrutinises the emerging promise of biofertilisers and microbial technologiesâ??no naÃ¯ve replacements, but synergistic enhancers capable of restoring soil vitality, improving nutrient-use efficiency, and relieving Indiaâ??s fiscal burden. Ultimately, it calls for a paradigm shift toward a resilient hybrid nutrient strategy that embeds biological intelligence into mainstream agriculture, fortifying both food sovereignty and climate resilience.



The 2025 fertiliser upheaval has laid bare the disquieting vulnerabilities of Indiaâ??s nutrient securityâ??an economy shackled to volatile global markets, skewed subsidies, and an unhealthy addiction to artificially cheap urea. What appears as a transient supply disturbance is, in reality, a geopolitical tremor triggered by Chinaâ??s export restrictions, Russiaâ??s selective opportunism, and the capriciousness of global energy prices, all converging to imperil the livelihoods of millions of smallholders. *This article therefore discusses* how emergency imports and ballooning subsidies merely anaesthetise a deeper malaise while the soil continues to suffer from decades of nutritional imbalance. It scrutinises the emerging promise of biofertilisers and microbial technologiesâ??no naÃ¯ve replacements, but synergistic enhancers capable of restoring soil vitality, improving nutrient-use efficiency, and relieving Indiaâ??s fiscal burden. Ultimately, it calls for a paradigm shift toward a resilient hybrid nutrient strategy that embeds biological intelligence into mainstream agriculture, fortifying both food sovereignty and climate resilience.

The global food system is once again under pressure from a fertilizer shock. In early 2025, prices surged sharplyâ??Diammonium Phosphate (DAP) and Triple Superphosphate experiencing the steepest escalation, while nitrogen markets oscillated amid volatile energy costs. *â??Every fertilizer crunch is more than an input shockâ??it exposes the fragility of food systems intertwined with energy and mineral geopolitics. For India, with one of the worldâ??s largest subsidy bills, surging global phosphate or nitrogen prices intensify fiscal strain and farmer vulnerability, while export curbs amplify these systemic risks â??, stated Renuka Diwan, CEO, BioPrime.*

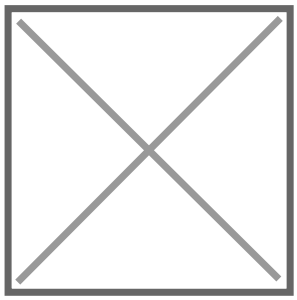


â??Fertilizer crunches arenâ??t mere supply shocksâ??they expose how fragile food systems are when tied to global energy and mineral geopolitics. Indiaâ??s fiscal and farmer vulnerabilities rise with every price surge. Crises like this urge systemic change: integrating biofertilisers, nutrient enhancers, and biostimulants can boost nutrient use efficiency, improve soil health, reduce subsidy burdens, and give farmers greater resilience and confidence.â?•

-Â *Renuka Diwan, CEO, BioPrime*

The crisis exposes systemic fragilities. *â??What we are witnessing is not merely a supply disruption but a systemic unravelling â?? where global export curbs, volatile energy costs, and our chronic import dependency have converged to expose the fragility of Indiaâ??s fertiliser architecture. The perversity of artificially low urea prices has distorted nutrient balance, while bureaucratic inertia in logistics and subsidy flows has compounded the malaise. In truth, the crisis is less about scarcity and more about structural myopia,â?• added Jayanta Chakraborty, Chairman, Agriculture Committee, BCC&I.*

Ajay Kakra, Leader â?? Food and Agriculture, GIDAS, Forvis Mazars in India, further explains how fertiliser crunch directly straining farmers and household budgets. *â??Global fertiliser prices have surged, with the World Bank index up 15 per cent in 2025, while TSP and DAP jumped roughly 43 per cent and 23 per cent , respectively. In India, the landed import price of DAP approached Rs 54,160 per tonne, and urea averaged $546 per tonne internationally. Governments are underwriting enormous costs: Indiaâ??s fertiliser subsidy outlays remain vast, with multi-thousand crore disbursements in recent years and targeted top-ups for phosphatic and potassic fertilisers of about $860 million in FY 2024â??25 â??,* he analysed.



â??Bio-fertilizers are vital for resilient, efficient, and sustainable agriculture. They reduce dependence on volatile imports, enhance nutrient uptake, restore soil health, lower chemical use, and cut emissions. With Indiaâ??s R&D, farmer networks, and supportive policies, rapid scale-up is possible. Immediate, medium, and long-term actionsâ??from emergency imports to local production clustersâ??can embed bio-inputs at the heart of our

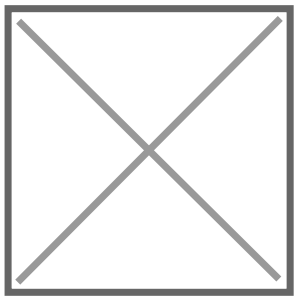
nutrient strategy.â?•Â

- Jayanta Chakraborty, Chairman, Agriculture Committee, BCC&I

Yet the crisis presents an inflection point. *â?? The fertiliser shortfall of 2025 isnâ??t just a supply glitchâ??itâ??s a wake-up call to the fragility of our food security, shackled to volatile energy markets, import dependencies, and subsidy distortions. Stopgap imports and capacity boosts may calm the panic, but theyâ??re band-aids on a structural wound,â?• stated Sohit Satyawali, Chief Business Officer - Brand Business, Crystal Crop Protection Limited. â??The real fix lies in rethinking our nutrient economyâ??treating biofertilisers and microbial inoculants as partners, not replacements, that boost efficiency, stabilise yields, and revive soil health. With fertiliser subsidies crossing Rs 2 lakh crore, even modest efficiency gains can unlock massive fiscal and farm-level payoffs. Field results already prove it: biological inputs are cutting chemical use by up to 15 per cent while keeping productivity intactâ??a rare win for both farmers and the exchequer ,â?•he opined.*

Chemical Crunch, Biological Boost

The 2025 fertilizer crisis underscores that agricultural inputs are no longer mere commoditiesâ??they are instruments of geopolitical strategy. China, a leading producer of phosphatic fertilizers, imposed export restrictions in January 2025 to stabilise domestic prices, immediately affecting India, which imports nearly 90 per cent of its phosphate from China. Shipments were delayed, local stocks depleted, and costs surged, exemplifying â??nutrient nationalism.â?•



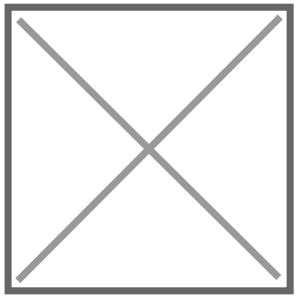
â??Global fertiliser prices have surged, with the World Bank index up 15 per cent in 2025, while TSP and DAP jumped roughly 43 per cent and 23 per cent , respectively. In India, the landed import price of DAP approached Rs 54,160 per tonne, and urea averaged $546 per tonne internationally. Governments are underwriting enormous costs: Indiaâ??s fertiliser subsidy outlays remain vast, with multi-thousand crore disbursements in recent years and targeted top-ups for phosphatic and potassic fertilisers of about $860 million in FY 2024â??25Â â??â??Â

- Ajay Kakra, Leader â?? Food and Agriculture, GIDAS, Forvis Mazars in India

Unlike the 2021â??22 disruptions, this crisis coincided with climate-linked production shortfalls and high energy prices, intensifying risks for import-dependent economies. Meanwhile, Russia continued selective exports despite sanctions, exploiting regulatory gaps and exposing the fragility of a strategically vital yet concentrated market. The repercussions for Indian farmers during the Kharif season were acute. States including Odisha, Tamil Nadu, Haryana, and Andhra Pradesh reported severe delays in urea, DAP, and NPK blends, with rationed allocations, long queues, and localized shortages threatening yields.

Harsh Vardhan Bhagchandka, President, IPL Biologicals , therefore streamlined the root cause of disruption in fertilizer supply chain : â??The very foundation of nitrogen productionâ??the energy-guzzling Haber-Bosch processâ??rests uneasily on natural gas, itself a hostage to the caprices of geopolitics and volatile energy markets. Meanwhile, phosphorus fertilisers such as DAP languish under export curbs from China, and the potash trade remains ensnared in the web of international sanctions. For a nation like India, which imports its entire potash requirement, this confluence of constraints not only imperils soil nutrition but also exacts a heavy toll on our foreign exchange and food sovereignty.â?•

Adding on to the perspective, *Vineet Jain, Managing Director , R M Phosphates & Chemicals Pvt Ltd further recommended â??Relying exclusively on emergency imports and inflated subsidies is but a palliative, addressing symptoms while leaving the underlying malady untouched. The true panacea lies in weaving biofertilisers and microbial inoculants into the very fabric of Indiaâ??s nutrient strategyâ??arming farmers against price shocks, alleviating the fiscal weight of subsidies, and restoring our soilsâ?? enduring fertility.â?•*

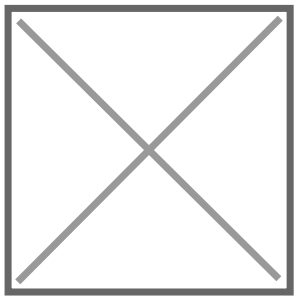


"*At Crystal, we foresaw this transition early and steadily built our GreenAg portfolio, which today includes trusted bio stimulants / nutrition brands like Talwar Zinc, Nutrozen, Marvel, and Calbrozen. These solutions have not only reduced farmersâ?? dependency on imported fertilizers but have also delivered superior ROI for small and marginal growersâ??a critical factor in sustaining their livelihoods.Â What truly differentiates the GreenAg portfolio is the way it is supported by our agronomists, known as â??Crystal Doctorsâ??, who actively engage with farmers to promote the importance of balanced crop nutrition and healthier soil ecosystems. â??*

â??Â *Sohit Satyawali, Chief Business Officer - Brand Business, Crystal Crop Protection Limited*

Dr. Suhas Budhe, Legal Advisor, SFIA, rightly terms 2025 fertilizer crisis as a perfect storm of interlinked vulnerabilities, thereby vividly illustrating how geopolitics, energy markets, and import dependence can converge to imperil both agrarian livelihoods and fiscal stability - *â??Chinaâ??s reimposition of specialty fertilizer export restrictions from October 2025 disrupted global supply chains, hitting India hardest, given its 80â??95 per cent dependence on Chinese imports. Volatile natural gas prices compounded the shock, as energy accounts for 60â??80 per cent of nitrogen fertilizer production costs. Domestically, urea stocks plummeted 57 per cent, from 86.4 to 37.2 lakh tonnes, just as the critical Kharif season began. Global DAP prices surged 36 per cent , from $583 to nearly $800 per tonne, sparking queues, protests, and panic buying among smallholders. The crisis also strained government finances, with Indiaâ??s fertilizer subsidy burden exceeding Rs 1.77 lakh crore.â?•*

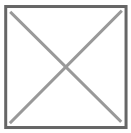
The 2025 fertilizer disruptions illuminate a cascade of agrarian vulnerabilities. Crop yields hang in the balance when timely and adequate nutrient supply falters, while smallholders grapple with inflated prices and black-market distortions that exacerbate financial distress.



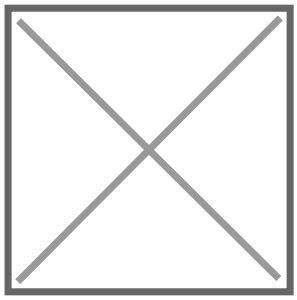
â??Integrating bio-fertilizers into cropping systems is essential for resilient, sustainable agriculture. These microbial inoculants enhance nutrient solubilization, improve plant uptake, and can supply 25â??40 per cent of soil nutrient needs. Combined with precision farming, they strengthen soil structure, support a healthy rhizosphere, and provide a scientifically sound, environmentally friendly, and economically viable path toward decentralized, future-ready nutrient management.â?•

â??Â *Harsh Vardhan Bhagchandka, President, IPL BiologicalsÂ*

Rising fertilizer costs, coupled with expanding crop acreage, further escalated production expenses and fueled wholesale price inflation. Domestic output struggledâ??urea dropped from 102.1â?¯lt to 93.6â?¯lt, DAP remained steady at 13.7â?¯lt, and NPK complexes edged up only modestly. Declining imports and depleting stocks intensified shortages, with partial relief achieved through substitutions like SSP and 20:20:0:13. Beyond immediate productivity, the crisis imperils food security and underscores the insidious erosion of soil health caused by over-reliance on chemical nitrogen, reminding us that short-term fixes often compromise the foundations of sustainable agriculture.



Amid this disruption, biofertilisers such as Rhizobium, Azospirillum, Bacillus megaterium, and phosphate-solubilising bacteria can buffer farmers, reduce chemical dependency, and mitigate exposure to global price volatility. â??Indiaâ??s vulnerability to global supply shocks underscores the imperative of self-reliance in agriculture.



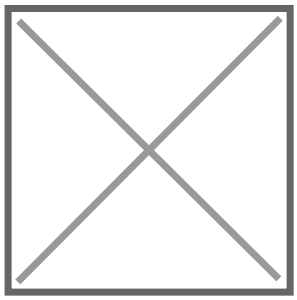
â??Fertilizer subsidies make inputs affordable for farmers but can inadvertently curb innovation in the industry. Fixed pricing and high chemical fertilizer support discourage investment in advanced formulations and slow adoption of organic and biological inputs. Globally, combining chemical fertilizers with microbes, biostimulants, and bioactive components enhances nutrient efficiency and soil health. Policy frameworks should incentivize sustainable, incremental innovation to create this synergy while reducing dependence on synthetic inputs.â?•

â??Â Shanmugam Sambanthan, Head-Agriculture, Middle East, South Asia and Africa, Novonesis

By indigenising the production of chelated micronutrients, high-density NPKs, and crop-specific formulations, we reduce import dependence, stabilise prices for farmers, and conserve precious foreign exchange ,â??â?? opined Dr. Rahul Mirchandani, Chairman, Aries Agro Limited. â??Our Make In India and import substitution initiatives have cut imported raw materials from 51 per cent in 2018â??19 to 18 per cent in 2024â??25. Localised manufacturing, R&D, and raw material sourcing are not mere operational choicesâ??they are instruments of Atmanirbharta, shielding our agrarian economy from the vicissitudes of international markets,â?• he added.

Toward a New Nutrient Paradigm

Biosolutions are indeed making inroads among Indian farmers, yet their adoption remains embryonic. â??Worth $ 100â??127.5 million in India and growing 8â??11 per cent annually, they can boost yields 10â??40 per cent when used alongside chemical fertilisers â??, opined Kakra. â?? Yet adoption is limitedâ??less than 5 per cent of farmers account for most usage. Scaling biologicals demands robust policy support: large field trials, quality certification, and strengthened extension services. Done right, they can curb import dependence, stretch subsidy funds, and restore long-term soil health,â?• he recommended.

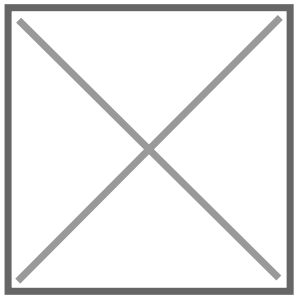


â??Relying solely on emergency imports and higher subsidies is like treating symptoms without curing the disease. The real solution lies in integrating biofertilisers and microbial inoculants into the core of Indiaâ??s nutrient strategy. These biological solutions can buffer farmers from future price shocks, lower the nationâ??s subsidy burden, and nurture soils for long-term fertility. â?•

â??Â *Vineet Jain, Managing Director , R M Phosphates & Chemicals Pvt LtdÂ*

For India to realise the full promise of these biological inputs, a target of 50 per cent coverage across all cultivable land is imperative. Achieving such scale through standalone farmer adoption, however, would be protracted, particularly given the fragmented mosaic of Indiaâ??s smallholder agriculture.Â Infact, India is uniquely positioned to lead this transition. Existing initiativesâ??the National Mission on Natural Farming, PM-PRANAM, and the Soil Health Card programâ??provide institutional scaffolding for mainstreaming microbial inputs.

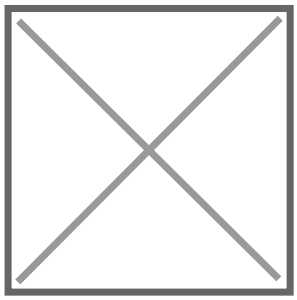
â??Biofertilisers are a potent alternative: a $2.5â??2.8â?¯billion global market growing 12â??18 per cent annually. Brazil sees 15â??30 per cent yield gains with 50 per cent less nitrogen; India reports 15â??20 per cent gains with 30 per cent nitrogen reduction â?•, advocated Dr. Buddhe . â??They cost 30â??50 per cent less than synthetics, improve soil health, sequester 0.5â??1â?¯tâ?¯C/ha annually, cut emissions, and create sustainable nutrient cycles via nitrogen-fixing and phosphate-solubilising microbes,â?• he stated.



â??Biofertilizers are a compelling alternative, with the global market projected to grow 12â??18 per cent annually. Brazilâ??s 80 per cent adoption boosts yields 15â??30 per cent while cutting nitrogen use by half; Indian trials show 15â??20 per cent gains with 30 per cent nitrogen reduction. Cost-effective, climate-positive, and soil-friendly, biofertilizers can transform nutrient cycles. Coordinated policy, farmer education, and public-private partnerships can build resilience and secure sustainable food systems.â?•

â??Â *Dr. Suhas Budhe, Legal Advisor, Soluble Fertilizers Industry Association (SFIA)*

While examining the drivers of the crisis, its local manifestations in India Shanmugam Sambanthan, Head-Agriculture, Middle East, South Asia and Africa, Novonesis, quantified the opportunity to integrate biofertilisers into new- age medium- and long-term nutrient strategies. â??The global fertilizer paradigm is evolving: biologicalsâ??microbes, bioactives, biostimulants such as seaweed extracts and humic acidsâ??are increasingly being woven into conventional formulations to enhance efficiency and rejuvenate soils. Biofertilisers are not adversaries of chemical fertilizers; they are synergistic allies, amplifying natural soil processes while chemicals deliver immediate nutrient support. Integrating these during production offers a bespoke, sustainable approach, gradually curbing synthetic dependence and tailoring nutrients to specific crops and agroclimatic conditions ,â?• he opined.



â??The challenge ahead is not just shielding Indian agriculture from external shocks, but integrating sustainable, Made-in-India solutions like high-density NPKs, crop-targeted fertilizers, and biostimulants into mainstream nutrient management. Combined with a strong domestic manufacturing base and scalable biological solutions, India can secure inputs, reduce subsidy burdens, and build the foundation for climate-positive agriculture. Aries Agro is proud to lead this journey.â?·

-Â *Dr. Rahul Mirchandani, Chairman, Aries Agro Limited*

Fertilizer manufacturers are therefore, evolving beyond standard NPK formulations, designing products tailored to the specific nutritional needs of high-value crops. Encouraging them to integrate biosolutionsâ??such as microbes (biofertilisers), enzymes, and biostimulants like cell-free microbials, protein hydrolysates, and amino acidsâ??into chemical fertilizers during production, supported through subsidies and capacity-building, can provide farmers with the combined benefits of biological and chemical inputs.

The 2025 crisis underscores that fertilizers are no longer mere chemical commodities but instruments of biological intelligence. In the words of Renuka, â??It is a call to embed resilience into the very fabric of agricultural systems. By combining chemical inputs with next-generation biologicals, India and the world can move toward nutrient security that is cost-efficient, climate-positive, and farmer-centered. We are not seeking replacement strategies but a total rebalancingâ??one that diversifies risk, safeguards productivity, and aligns agriculture with global sustainability goals.â?·

---------- Suchetana Choudhury (suchetana.choudhuri@agrospectrumindia.com)