Can India break its urea habit? Arya.ag warns of deeper fertiliser vulnerabilities ahead

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As concerns mount over potential disruptions in global fertiliser supply chains amid escalating geopolitical tensions, Anand Chandra, Co-founder & Executive Director of Arya.ag, argues that Indiaâ??s fertiliser security challenge extends far beyond import dependence. **In an exclusive interview with *Agrospectrum***, he highlights how vulnerabilities in natural gas-linked urea production, imbalanced nutrient consumption, and supply-chain bottlenecks could emerge as critical pressure points during periods of global uncertainty.

Chandra emphasises the need to shift the conversation from mere input availability to nutrient-use efficiency, advocating greater adoption of precision agriculture, soil testing, digital advisory systems, biofertilisers, and alternative nutrient solutions. He also underscores the importance of strengthening fertiliser resilience through diversified sourcing, smarter logistics, stronger extension systems, and farmer-centric policy reforms. According to him, the long-term solution lies in building a more balanced and sustainable nutrient ecosystem that safeguards both productivity and agricultural resilience.

In the event of a sustained disruption in West Asian supply chains, how structurally vulnerable is Indiaâ??s urea ecosystem, given its dependence on imported natural gas and fertilizer intermediates, and where do you see the first points of systemic stress emerging: availability, pricing, or allocation?

Indiaâ??s urea ecosystem has become more resilient over the years, but it is not insulated from global shocks. The vulnerability is two-fold: India imports a part of its urea requirement, and domestic urea production itself depends heavily on natural gas. A Parliamentary Committee recently noted that natural gas accounts for nearly 90 per cent of the cost of urea

production and that a significant share of the gas requirement is import-linked.

In such a scenario, the stress may not be visible as an immediate retail price shock because urea prices for farmers are administered. The pressure would first show up in procurement costs, subsidy burden, working capital cycles for companies, shipping timelines, and allocation across states. If the disruption continues into peak sowing windows, availability at the retail point and localised allocation pressure could become the bigger concern.

The real challenge, therefore, is not only national-level stock availability, but how quickly supply can be moved to the right geography, at the right time, and in the right quantity and that too at the right price.

India has repeatedly expanded domestic urea capacity, yet import dependence persists. To what extent is this a feedstock constraint versus a legacy policy architecture that continues to incentivise urea over balanced fertilisation?

I feel it is both. On the supply side, India has added meaningful urea capacity. Six new urea plants have been commissioned in recent years, adding 76.2 LMT of capacity, and domestic urea production crossed 314 LMT in 2023â??24. (Press Information Bureau) But capacity expansion alone cannot fully solve dependence when the core feedstock, which is natural gas, is itself exposed to global prices and geopolitical risks.

On the demand side, the policy architecture has historically made urea the most familiar and affordable fertilizer for farmers. This has helped food security, but it has also created an imbalance in nutrient use. Farmers respond to price, risk, crop habit and field-level experience. When urea remains the most accessible nutrient, balanced fertilisation becomes harder to achieve at scale.

The long-term answer has to combine feedstock security with a gradual correction in nutrient incentives, better soil testing, farmer advisory, and confidence-building around alternatives. A silver lining in this problem could be a compelled movement towards nutrient based fertilizers as a substitute to Urea.

If global urea availability tightens sharply, do you believe Indiaâ??s fertilizer subsidy framework is sufficiently agile to prevent price distortions and black-market leakage, or would rationing and administrative allocation inevitably return?

India has a strong administrative system for fertiliser planning. Requirements are assessed before each cropping season in consultation with states, and monthly supply plans are issued and monitored by the Department of Fertilisers. This gives the system a degree of preparedness. However, subsidy agility does not always mean that physical stock is available. A subsidy can absorb price shocks for the farmer, but it cannot immediately create supply if global cargoes are delayed or diverted. In a sharp and prolonged disruption, the pressure would likely be felt first in tighter allocation, closer monitoring of stock movement, and more active coordination between the Centre, states, companies and retailers.

Rather than assuming a return to rationing or leakage, the focus should be on preparedness. Stronger real-time visibility into stock, clear communication about expected arrivals, and timely movement into high-demand districts can help protect farmers' confidence during peak sowing windows. The subsidy framework can cushion prices, but supply-chain responsiveness will determine how smoothly the system holds up.

Given the geopolitical concentration of fertiliser supply chains in West Asia and a few other geographies, should India treat urea as a strategic commodity akin to crude oil, requiring sovereign procurement buffers or strategic reserves?

Urea is a critical agricultural input, and any discussion of its security must be viewed in the context of food security, farmer confidence, and seasonal preparedness. However, it may not be appropriate to compare it directly with crude oil, as the demand cycles, storage dynamics, subsidy structures, and distribution systems differ significantly.
For India, the priority should be to build resilience across the fertiliser value chain. This includes diversified sourcing, long-term supply arrangements, stronger domestic production, feedstock security, adequate pre-season planning, and better visibility of district-level demand and stock movement.

Strategic reserves or procurement buffers can be one part of the policy discussion, but they should be designed around India's crop cycles and regional demand patterns rather than as a direct replica of the crude oil model. The larger objective should be to ensure that farmers have timely access to essential nutrients during sowing windows, without creating uncertainty at the farm level.
Fertiliser security, therefore, needs to be treated as an important part of agricultural resilience. The approach has to be practical, calibrated, and closely aligned with farmers' needs.

How realistic is a large-scale behavioural shift among Indian farmers towards alternative nutrients â?? such as nano-urea, biofertilizers, or custom blends â?? during a period of acute urea scarcity, given entrenched usage patterns and risk aversion at the farm level?

A large-scale behavioural shift in fertiliser use is usually gradual by choice or compelled by circumstances, particularly in crops where nutrient practices are well established. Farmers make input decisions with yield security in mind, so any transition to alternative nutrients has to be supported by clear evidence, local demonstrations, and practical guidance, which would make adoption difficult but not impossible

Alternatives such as nano-urea, biofertilizers, organic inputs, and customised blends have an important role in improving nutrient efficiency. However, they are most effective when positioned as part of a balanced nutrient management approach rather than as simple one-to-one replacements. Adoption will depend on local availability, crop-specific recommendations, soil conditions, and confidence built through trusted advisory channels.

The shift should therefore be built steadily through soil testing, FPO-led demonstrations, agri-retailer training, and extension support. Farmers are more likely to adopt new nutrient solutions when they see consistent results in similar crop, soil, and irrigation conditions. The larger opportunity is to move from input intensity to input efficiency. Farmers will adopt alternatives when they are confident that productivity, timing, and risk are well managed.

If urea prices spike globally, what is the likely second-order impact on cropping patterns in India â?? particularly rice and wheat â?? and could this inadvertently accelerate crop diversification more effectively than policy interventions have managed so far?

Global urea price movements may not directly translate into a proportional impact on farmers because India has a strong subsidy and supply-management framework for fertilisers. For farmers, the more relevant factors are timely availability, local access, crop economics, and confidence in the season. Rice and wheat are established cropping systems in many parts of India, supported by irrigation, procurement, familiarity with inputs, and market linkages. Therefore, any change in cropping patterns is unlikely to happen only because of a movement in one input price. Farmers usually make crop choices based on a wider set of considerations, including assured markets, expected returns, water availability, labour, credit, and local agronomic conditions.

Crop diversification remains important for long-term agricultural resilience, but it must be enabled by market assurance, storage, processing capacity, procurement confidence, and farmer-level advisory services. Pulses, oilseeds, millets, and other less input-intensive crops can gain traction where the economics are reliable and the ecosystem supports the farmer beyond production.
So, while input price volatility can influence farmer decision-making at the margin, it is unlikely to be a durable driver of diversification by itself. A sustained shift will come from making alternative crops commercially attractive, operationally viable, and less risky for farmers.

To what extent can precision agriculture, soil testing, and digital advisory systems meaningfully reduce urea intensity per hectare in India, or are these gains marginal without deep structural reform in input pricing and extension systems?

Precision agriculture, soil testing, and digital advisory can meaningfully reduce excess urea use, but only when they are connected to farmer decision-making at the right time. A soil health card or advisory message has limited value if the farmer cannot access the recommended nutrients, does not trust the recommendation, or finds urea cheaper and easier to use.

The biggest gains will come when digital advisory is local, crop-specific, and linked with input availability, FPO-level aggregation, extension support, and market incentives. Technology can tell a farmer how much nutrient is needed, when to apply it, and where the crop is stressed. But behaviour changes when the advice is backed by field demonstrations and economic benefit.
So, these tools are important, but they cannot work in isolation. They need pricing reform, stronger extension systems, and trusted local institutions.

Looking ahead, does Indiaâ??s fertiliser security challenge require a complete rethinking of its nitrogen economy â?? potentially shifting from import-dependent urea molecules to decentralised, locally produced nutrient systems anchored in circular bioeconomy models?

India's fertiliser security challenge calls for a broader and more balanced approach to nutrient management. Urea will continue to remain an important input for Indian agriculture, especially for major crops where farmers have established practices. The priority should be to improve nutrient efficiency and reduce excessive dependence on any single input over time.

This transition has to be gradual and farmer-centric. Alongside domestic production and diversified sourcing, there is a growing role for nano and speciality nutrients, biofertilizers, composting, crop residue management, and other locally relevant solutions. Circular bioeconomy models can add value by converting local biomass, livestock waste, and organic residues into reliable nutrient sources.

However, these models will scale only when they are backed by quality standards, predictable supply, scientific validation, and farmer confidence. For farmers, the key question will always be whether the solution protects productivity and fits into their existing crop cycle. The larger opportunity is to move from input volume to nutrient efficiency. A more diversified nutrient system can support soil health, improve resource use, and strengthen long-term agricultural resilience, while keeping farmer productivity at the centre.

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