Cost of Subsidising Chemical Fertilisers

and the Future of Food Security

Food security has long been synonymous with increasing agricultural production. Post World War II, chemical fertilisers, particularly nitrogen, played a transformative role in helping countries overcome chronic food shortages. Fertiliser subsidies enabled millions of smallholder farmers to adopt modern inputs, dramatically increasing crop yields and preventing widespread hunger. There is little doubt that these policies contributed significantly to global food security. The question today, however, is no longer whether governments should support farmers. It is whether they are supporting them in the most effective way?

Global agriculture now produces nearly 3 billion tonnes of cereals annually, supported by the application of almost 200 million tonnes of plant nutrients (N, P_2O_5 and K_2O) every year. While this has enabled the world to feed more than seven billion people, excessive and imbalanced fertiliser use has emerged as one of the greatest threats to the sustainability of food systems. Across both developing and developed countries, indiscriminate application of subsidised chemical fertilisers is degrading soils, polluting water resources, reducing biodiversity, increasing greenhouse gas emissions and compromising the long-term resilience of agriculture.

Governments collectively spend tens of billions of dollars every year subsidising chemical fertilisers. Although these subsidies continue to protect farm incomes and help keep food prices affordable, they also distort nutrient pricing and encourage excessive application of certain fertilisers, particularly nitrogen. The environmental, economic and public health costs of these distortions are seldom accounted for, yet they are becoming increasingly difficult to ignore.

India perhaps presents the clearest illustration of this policy contradiction. The country spends approximately $25–30 billion annually on fertiliser subsidies, making it one of the world's largest subsidy programmes. Urea continues to be sold to farmers at a fraction of its actual cost, with the Government absorbing nearly 90

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percent of the delivered price. Ironically, despite repeated policy commitments to promote biofertilisers, biological inputs and balanced plant nutrition, these alternatives receive only a small fraction of the financial support extended to conventional chemical fertilisers. The stated policy objective and the fiscal incentive are fundamentally at odds.

Farmers naturally respond to prices rather than policy statements. When nitrogen is heavily subsidised while biological alternatives, crop customised and foliar fertilisers, remain relatively expensive, excessive nitrogen application becomes economically rational. Consequently, in countries like India, the desirable N:P:K ratio has deteriorated to around 10:4.5:1 or even worse, reflecting serious nutrient imbalance. Similar trends can be observed across many developing countries where subsidy structures overwhelmingly favour nitrogen over balanced nutrient management.

The consequences extend far beyond crop productivity. Continuous overuse of nitrogen, coupled with declining incorporation of organic matter, has steadily depleted soil organic carbon (SOC). Across vast agricultural landscapes in Asia, Africa and many other parts of the world, soil organic carbon has fallen below one percent, weakening soil structure, reducing microbial activity, diminishing water-holding capacity and making farming systems increasingly vulnerable to droughts, floods and climate change. Healthy soils, built over centuries, are being degraded within a few decades.

The environmental costs are equally alarming. Nitrogen not absorbed by crops leaches into groundwater, contaminates rivers, lakes and coastal ecosystems, and contributes to eutrophication. Large quantities are emitted into the atmosphere as nitrous oxide, one of the most potent greenhouse gases. Excessive nutrient application also increases nitrate contamination in food and drinking water, creating growing concerns for both human and animal health. These hidden costs rarely appear in government budgets, but society ultimately pays for them.

Recent geopolitical developments, including concerns over disruptions in the Strait of Hormuz, through which a substantial share of the world's fertiliser raw materials and energy supplies move, have once again exposed the vulnerability of countries heavily dependent on imported fertilisers. Rather than viewing such disruptions merely as temporary supply crises, governments should seize this opportunity to fundamentally redesign fertiliser policies.

Future food security will depend not on applying more fertiliser, but on producing more food with fewer nutrients. The next agricultural revolution must therefore focus on nutrient-use efficiency rather than nutrient-use intensity.

A gradual reallocation of public expenditure from blanket fertiliser subsidies towards innovation would generate far greater long-term returns. Greater investments are needed in crop-specific liquid fertilisers, precision nutrient management, fertigation, foliar nutrition, nano-fertilisers, biofertilisers, microbial inoculants, digital advisory platforms, soil testing and farmer education. These technologies can substantially improve nutrient-use efficiency, reduce input costs, minimise environmental losses and lessen dependence on imported fertilisers.

Farmers themselves should not be blamed. For decades, public policy has conditioned them to associate lush green crops with productivity by making nitrogen artificially cheap. Any attempt to rationalise fertiliser prices without simultaneously providing better technologies, extension services and transitional support will inevitably provoke political resistance. Reform must therefore be gradual, preceded by extensive education, predictable and firmly centred on farmers' interests.

The world now needs a Global Mission on Balanced Nutrient Use and Soil Health, led jointly by national governments, FAO, World Bank, IFAD, IFDC, and the private sector, coordinated by organisations like World Agriculture Forum or the World Economic Forum. Redirecting even 20–30 percent of existing fertiliser subsidies towards research, innovation, biological inputs, precision agriculture and farmer capacity building could dramatically improve soil health, reduce pollution and strengthen global food security.

The objective of agricultural policy should no longer be to maximise fertiliser consumption. It should be to maximise productivity per unit of nutrient applied while restoring the health of our soils. Food security in the twenty-first century will depend less on the quantity of fertiliser applied and far more on the quality of soils preserved.

The future of agriculture lies not in subsidising fertilisers, but in subsidising knowledge, innovation and soil health.

That transition may well be the single most important policy reform required to secure global food security sustainably.