Frank Notes

Sustainability in Fertilizer and Agriculture Sectors

The FAI Annual Seminar 2024 organized during 4-6 December 2024 in New Delhi deliberated on vital subject of sustainability in fertilizer and agriculture sectors. Seventeen presentations spread over four sessions highlighted the areas related to effectiveness of extant policies, adoption of digital technology in agriculture, impact of geo-political situations on prices of raw materials and finished products, import dependence on critical raw materials, decarbonisation of fertilizers, and innovative supply chain management.

Role of fertilizers in contributing about 50% to the food grain production has been well established through various researches worldwide. In Indian context, policies paved the way for making fertilizers available to every nook and corner of the country at affordable prices. At present, India has accomplished not only self-reliance in food grain production but also became exporter of rice despite the fact that a large number of population is relying on free food scheme. Policies have intended to stabilize both input and output prices, however, over the years it has resulted in significant increase in fertilizer subsidies. The situation became more precarious during pandemic and geo-political conflicts during last few years.

During the development phase of the fertilizer sector, the policy played a catalytic role in promoting indigenous fertilizer production coupled with high yielding variety of crops, which resulted in increase in food grain productivity. Of late, there has been deterioration of soil health and imbalance in use of fertilizers leading to low farm productivity. This raises the question whether the policy of low input prices and low food grain prices is sustainable over long-term. The policymakers may revisit the extant policies for bringing efficiency in fertilizer and agriculture sectors. Among various suggestions, the government may consider transfer of fertilizer subsidy directly in the bank account of the farmers. Mechanisms such as coupon/vouchers to farmers for purchase of right type of fertilizer may help in reducing inefficiencies and diversions. The timeline for such mechanism to take place is estimated to be 1-3 years. Till the time direct benefit of subsidy to the farmers is implemented, bringing urea under nutrient based subsidy policy may be considered to promote balance fertilization.

Looking to the challenges in agriculture, the Government of India has launched PM PRANAM scheme to incentivize the States and Union Territories to promote the use of alternate fertilizers such as organic and bio-fertilizers to improve soil health and farm productivity. Towards this, use of fertilizer in balanced proportion as per soil test based recommendations along with organic manures and bio-fertilizers by the farmers across the country is of paramount importance. Further, use of modern techniques and digital technology can also play an important role in making agriculture sustainable. Digitalization, use of artificial intelligence and machine learning have the potential in bringing efficiency in agriculture sector. A farmer in any nook and corner of the country can take advisory help from an expert sitting in any part of the world. Development of digital tools and information in vernacular language will go a long way in making such tools more meaningful to the framers. Use of e-commerce platform can be targeted to promote informed decision by farmers on right type of input and saving in overall farming cost. However, acquiring geographical and agronomy dataset is necessary for successful digital marketing and the Government agencies can help in this direction and e-commerce platform needs to be given more impetus for marketing of agri-inputs.

Another important subject of discussion was the impact of green-house gases on climate change. It

Sustainability in the fertilizer and agriculture sectors demands realignment of the current policies, adoption of efficient farming practices, integration of digital technologies, and implementation of effective last-mile delivery systems.

is widely acknowledged that green-house gases have adverse impact on climate. The contribution of fertilizer sector from both production and application stands at 2.5% of global GHG emissions. The GHG emissions from agriculture sector can be mitigated by improving nutrient use efficiency. Use of slow release fertilizers and implementing modern technologies for targeted applications like deep placement, drones, drip irrigations are some of the methods to improve nutrient use efficiency. Nano-products are emerging as alternative fertilizers with lower carbon footprint during their lifecycle. Government may consider for financial incentives in adoption of Nano-fertilizers by the farmers.

Different pathways have been suggested to mitigate the GHG emissions from fertilizer production. Technologies are available for improving the efficiency and decarbonisation of fertilizer plants. The existing fertilizer plants have adopted cleaner feedstock and implemented schemes to reduce consumption of fossil fuel, water and chemicals to reduce environmental footprint. In the last few years, highly efficient state-of-the-art new plants were commissioned with low carbon footprint. As a result of concerted efforts and introduction of new plants, the energy consumption of urea plants has reduced from 8.87 Gcal MT^{-1} in 1987-88 to 5.55 Gcal MT^{-1} during 2023-24, a reduction of 37.4%. This corresponds to reduction of carbon dioxide emission by 47%. Conservation of water by implementing measures to reduce, reuse and recycle have resulted in considerable improvement in water consumption. The weighted average water consumption of urea plants reduced by almost 52% and complex fertilizer plants reduced by over 60% in the last 34 years.

Plants are also using renewable energy as far as possible. Presently, use of green hydrogen and green ammonia is challenging due to technical limitation and higher cost in the existing plants. However, it is projected that with the government policy interventions and fiscal incentive, it would become viable in the near term. Digitalization in process plants has been helping in smooth operation of the plants. Use of technology like drones are helping plant management in monitoring health of equipment so that informed decision can be taken well in advance to tackle unforeseen situations. With the help of AI and ML, plant management are provided with predictive, preventive and prescriptive solutions from a remote location. These have resulted in higher efficiency, reliability and safety of plant and equipment.

The availability and prices of fertilizers were affected due to geopolitical disputes, tariff sanctions and supply chain disruptions. However, it is expected that prices of major raw materials and commodities would be stabilized in short term. Countries like India with limited natural resources have to insulate by exploring new suppliers of these resources. Technological innovation by utilization of low-grade rock phosphate is a promising avenue for using resources available in the country. Incentivising adoption of the technology by the industry would help in reducing import dependence in phosphatic fertilizers and generate employment at regional level.

The present issue of India Journal of Fertilisers provides the glimpses of FAI Annual Seminar 2024. The issue covers the message of the Hon'ble Union Minister of Chemicals and Fertilizers and Health and Family Welfare and address of Hon'ble Ministry of State for Chemicals & Fertilizers and Health & Family Welfare. The brief report of all four sessions covering the salient points of each presentations are also included. The comprehensive conclusions and recommendations of the Seminar have been drawn for the attention of policy makers, industry, farmers and other stakeholders. ■