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Specialty Fertilizers in Indian Agriculture

coated urea, fortified fertilizers, customized fertilizers (CFs), micronutrient fertilizers, and liquid fertilizers.

Nitrogen (N) has drawn maximum attention in the specialty nutrition. It poses maximum risk to environment as the N not used by plant either leaches down to groundwater as nitrate or lost to the atmosphere in gaseous form namely, ammonia and nitrous oxide (a highly potent greenhouse gas). The production and consumption of N is largest among all the plant nutrients. Improvement in nitrogen use efficiency is critical to address the challenges of global food security, environmental degradation, and climate change. A number of products such as CRFs, SCU, SRFs, SNFs have been developed to bring significant increase in the nitrogen use efficiency. Being costlier than bulk products, use of these specialty fertilizers is limited largely to the developed countries. These fertilizers are mostly used in high value crops, horticulture, turf, landscape, etc. having justification for premium value.

Fertilizer is one of the key inputs in crop production. India made rapid growth in fertilizer consumption after the introduction of high yielding varieties in mid-1960s and by 2005, the country became the 2nd largest user of fertilizers in the world in terms of total nutrients. However, the per hectare fertilizer consumption is still low and imbalanced at the macro level. The imbalanced and inefficient use of fertilizers have led to the accelerated emergence of multi-nutrient deficiencies, low nutrient use efficiencies, declining partial factor productivity, lowering of crop yields and farm profits, and environmental pollution.

The growing requirement for high quality crops, environmental concerns, and thrust on improved nutrient use efficiency (NUE) have driven the growth of specialty fertilizers world over. These fertilizers bring additional benefits to growers by way of enhancing nutrient availability, slowing down bacterial activity, and meeting exact nutrient needs of the crop. The specialty fertilizers are developed through sustained experimentation to suit matrix of soil fertility status, type of crop, and availability of water under specific climatic conditions. The application schedule for these fertilizers is also developed taking into account the crop growth stage and also physical, chemical and biological properties of the soil.

Specialty fertilizers include an array of products ranging from low-end stabilized nitrogen fertilizer products for broad area cropping systems, to high value premier products ranging from water soluble fertilizers (WSFs) for foliar fertilization and drip-fertigation to controlled release fertilizer products for turf and ornamental plants. There is no universal definition or category of specialty fertilizers. International Fertilizer Association (IFA) included controlled release fertilizers (CRFs), slow release fertilizers (SRFs), sulphur coated urea (SCU), stabilized nitrogen fertilizers (SNFs), WSFs, liquid NPKs, and chelated micronutrients and boron in their assessment study of the global market for special products. In India, the specialty fertilizers are categorized broadly as water soluble fertilizers, neem

Global specialty fertilizers market registered a significant growth over last decade with compound annual growth rate (CAGR) ranging from 6% in WSFs to more than 16% in CRFs. The global consumption of specialty fertilizers reached 20.4 million tonnes (Mt) in terms of products and 9.0 Mt in terms of nutrients in 2018. Category-wise, the consumption reached 2.1 Mt for CRFs, 2.8 Mt for SRFs and SCU, 10.7 Mt for SNFs, and 3.6 Mt for WSFs. These fertilizers represent 10% of total fertilizer market in terms of value and nearly 5% of nutrient volume. The main drivers for growth of specialty fertilizers are base fertilizer, cropping systems, soil and climate conditions, regulations, and value-in-use. East Asia, North America, Latin America, and West and Central Europe are the major markets for specialty fertilizers.

Indian fertilizer companies started the R&D work on specialty products in early 1980s. IFFCO developed urea super granule (USG), a slow release nitrogenous fertilizer and conducted large scale field demonstrations/trials to evaluate its agronomic efficacy. These demonstrations /trials established the superiority of USG over the prilled urea and USG was included in the FCO in 1990. The absence of suitable applicator for placement of USG in soil was the main constraint in its adoption by the farmers. The National Fertilizers Limited (NFL) developed urea ammonium nitrate (UAN), a liquid nitrogenous fertilizer. Based on agronomic advantages, UAN was included in FCO in 1995. Again, the use of UAN could not be commercialized due to the transportation and storage problems.

The country has witnessed sharp increase in consumption of WSFs in recent years reaching a level of 2,65,000 t in 2019-20. Expansion in area under horticulture and high value crops, and increased

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coverage under micro-irrigation have been the key drivers of growth in the consumption of WSFs. With a view to promote and regulate their use, Government of India (GOI) notified WSFs in FCO in 2003. The use of WSFs is largely concentrated in the horticulture-growing areas of Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu, Gujarat, and Uttar Pradesh. It may be mentioned here that there is no subsidy on WSFs. Farmers have accepted these fertilizers on merits in terms of increase in yield, quality of crop and net income.

Development of neem oil coated urea (NCU) in India has drawn global attention. Indian scientists reported nitrification inhibiting properties of *Neem (Azadirachta indica A. Juss)* during early 1970s and developed neem cake coated urea (NCCU) in 1983. Superiority of NCCU over prilled urea was established by number of researchers during 1980s and 1990s. The GOI permitted NFL and two other companies to produce and market NCU in 2004 but at the same price as plain urea *i.e.* without neutralization of additional cost incurred for NCU. Consequently, there was not much production and sale of NCU until 2007-08. In 2008, GOI allowed urea manufacturers to recover the cost of coating from farmers by selling NCU at a price of up to 5% above maximum retail price notified for plain/ prilled urea. However, there was a cap of 20% on production of coated urea with neem oil which was increased to 35% in 2011. In May 2015, GOI made it mandatory to produce 100% of indigenous urea as neem-coated urea and coating of entire imported urea on its arrival at the ports.

The use of conventional fertilizers fortified/coated with micronutrients constitutes the ideal strategy to correct the deficiencies of micronutrients incorporated therein. The fortified fertilizer facilitates the uniform application of small amounts of micronutrient fertilizer(s) without going in for a separate application. The zincated urea (2% Zn) was the first fortified fertilizer notified in FCO in 1992 but its commercial production could not start because the cost of fortification/coating urea with Zn far-exceeded the realization through notified MRP of zincated urea. Government of India introduced a policy for encouraging the production and availability of fortified and coated fertilizers in 2008. Under this policy, manufacturers of subsidized fertilizers have been allowed to fortify/coat up to 20% of their production. The manufacturers have also been allowed to charge additional cost involved in manufacture of these fertilizers as per government guidelines. Under the nutrient based subsidy (NBS) scheme, there is also a provision of giving additional subsidy of Rs. 500 and 300

per tonne for fortification of subsidized fertilizers with zinc and boron, respectively. A number of fortified fertilizers were developed by industry and also included in FCO. However, the commercial production of fortified fertilizers has not picked up even after these policy initiatives. Recently, some SSP manufacturers have started production and sale of SSP fortified with zinc and boron.

To address the problem of emerging multi-nutrient deficiencies, GOI included the customized fertilizers (CFs) in FCO. These fertilizers are crop- and area-specific and are manufactured through a systematic process of fusion-blend granulation or precision blend technology providing uniform quality. These are multi-nutrient carriers designed to contain macro, secondary and/or micro nutrients. CFs provide great opportunity for innovation in fertilizer formulation to ensure balanced nutrient management. In spite of their proven superiority, use of customized fertilizers has so far remained restricted to a few areas and crops. Only two companies are in the production and marketing of customized fertilizers.

For the first time, 5 liquid fertilizers have been included in FCO last year. However, their acceptance by farmers is yet to be seen. Similarly, one product of nano fertilizer *i.e.* Nano-urea (liquid) nitrogen has also been included in FCO this year. It is a noteworthy achievement in specialty nutrition and India is going to be the first country to start commercial production and sale of nano fertilizer.

It must be recognized that the nutrient needs of Indian agriculture are now bigger and more varied. Fertilizers are a costly input and their availability is also limited. These should be used in most efficient manner under fertilizer best management practices developed on the 4R Nutrient Stewardship principles. The use of specialty fertilizers except WSFs remains low. To encourage the production and use of specialty fertilizers, GOI should bring in policy reforms in terms of easy introduction of new innovative fertilizers, NBS for all fertilizer products in schedule I of FCO subject to some safeguards and uniform tax structure. State Governments should develop effective mechanisms to have accurate month-wise information on import, production and sale of specialty fertilizers. Research institutions should be encouraged to undertake more research and evaluation studies on innovative specialty products. Fertilizer industry and research institutions (ICAR & SAUs) should pool their resources in R&D of specialty fertilizers. Fertilizer industry also needs to adopt a different marketing approach for new innovative specialty products. The marketers have to shift their focus from 'selling product' to 'selling crop nutrition solutions'.

The present issue of Indian Journal of Fertilisers is devoted to the theme of 'Role of Specialty Fertilizers in Indian Agriculture' with contribution from specialists both from research institutions and industry. ■