

## Promoting Alternative Fertilizers for Sustainable Agriculture

Frank Notes



**Arvind Chaudhary**

Agriculture is the backbone of Indian economy. Use of fertilizers is indispensable for agriculture development for food and nutritional security. Fertilizer has played and will continue to play pivotal role in increasing agricultural production. The testimony of the fact is that use of fertilizers in terms of nutrients has increased from meagre 65,600 MT during 1951-52 to 29.84 million MT during 2022-23. On the other hand, production of food grains has increased from 52 million MT to 330.5 million MT during the corresponding years. There has been significant increase in production of horticultural, oilseed, sugarcane, cotton, jute & mesta, spices, coffee and tea crops, etc. during the period. The agriculture sector has also been playing a key role in earning foreign exchange. The exports of principal agricultural commodities during 2021-22 has been Rs. 3.8 lakh crore contributing 11.9% to National exports. There is no room for complacency. However, the production of agricultural commodities has to keep pace with the growing demand of burgeoning population and also for earning foreign exchange on sustainable basis. Challenges in agriculture are cropping up such as deterioration in soil health, imbalance in use of fertilizers, decline in crop response to fertilizers, low organic carbon and nutrient use efficiency; emergence of multi-nutrient deficiencies; and enhancement of pollution footprints.

Government of India is alive to these problems and has announced new packages for farmers such as market development assistance scheme to exemplify model of Wealth from Waste, *Parali* and organic manures from Goverdhan plants to enrich soil and keep environment safe and clean; strengthening of nano-urea ecosystem; introduction of sulphur coated

urea (urea gold); Pradhan Mantri Kisan Samruddhi Kendras for meeting all needs of farmers under one roof inclusive of advisory services; PM Programme for restoration, awareness generation, nourishment and amelioration of Mother-Earth' (PM PRANAM – Promotion of Alternate Nutrients for Agriculture Mngement). The objective of these schemes is to boost well-being of farmers, rejuvenate soil productivity, ensure food security and environmental sustainability.

Central Fertilizer Committee (CFC), under the Ministry of Agriculture and Farmers Welfare, has been recommending various fertilizer products for notification in Official Gazette of Government of India. Large numbers of products have been included in Fertiliser (Control) Order (FCO), 1985. In addition to traditional fertilizers, use of alternative products comprising 100% water soluble fertilizers, micronutrients, bio-fertilizers, fortified and customized fertilizers, organic fertilizers, bio-stimulants, nano urea and nano DAP, beneficial element fertilizers, etc. is necessary to supplement nutrient requirement of crops. Such products, in addition to supplementing the nutrient needs and quality of the crops, also improve farm productivity and soil health.

There are nine 100% water soluble fertilizers (WSFs) and 12 liquid fertilizers under Schedule 1 of FCO, 1985. In addition, the other products of WSFs can be produced or imported under general specifications of 100% water soluble mixture of fertilizers containing 40% NPK or 30% two primary nutrients with or without secondary or micronutrients (Zn, B, Mn, Fe, Cu, Mo). Many fertilizer companies are engaged in production/import of WSFs and making these fertilizers available to the farmers. Compound annual growth rate of such fertilizers is around 20% from 2005-06 to 2021-22. Around 3.3 lakh MT quantity was used by the Indian farmers during 2021-22. These fertilizers are applied through foliar and drip-irrigation systems. Application of fertilizers through drip-irrigation is generally referred as fertigation. Use of 100% WSFs through these system improves fertilizer as well as water use efficiency. In view of high cost, such fertilizers are used by large farmers in horticultural and high value crops. Use of these fertilizers under protected cultivation methods such as greenhouses is growing due to tailor made nutrient solutions as per need of the crops.

**In view of imbalance in use and decline in crop response to fertilizers, alternative sources of fertilizer products along with the conventional fertilizers need to be given more impetus for better nutrient management and farm income. This is necessary for sustainable agriculture.**

Micronutrients are required by plants in small amount but as per criteria of essentiality, they are equally important for better growth of the plants. There are 25 micronutrients-based fertilizers in FCO, 1985. These are manufactured by the small players except zinc sulphate monohydrate by IFFCO and zinc sulphate heptahydrate by a subsidiary of KRIBHCO. In view of low use efficiency (2-5%), the need is to find out ways and means for improving the same. Farmers need to be educated to use such fertilizers based on soil testing to obtain better yields with quality produce. Out of about 3.0 lakh MT use of micronutrient, share of zinc sulphate is 68%.

There are thirty four Mg, S, Zn, B and Si based fortified P&K fertilizers and zincated urea, boronated sulphur and zincated sulphur in FCO, 1985. There is additional subsidy for coating of Zn on urea. However, it is not economically viable as per the pricing policy and the Government may address this issue. For fortification of P&K fertilizers with B and Zn, there is additional subsidy of Rs. 300 and Rs. 500 per MT of material, respectively. Zincated SSP and boronated SSP and SSP fortified with Zn and B are being produced and marketed by SSP industry. About 1.65 million MT of zincated SSP, 47,800 MT of boronated SSP and 6.38 lakh MT of SSP fortified with Zn and B were sold by the SSP industry during 2022-23.

A policy on customized fertilizers was issued in 2008 under clause 20B of FCO, 1985 to encourage balanced fertilization and improve nutrient use efficiency. Twenty eight grades of these fertilizers have been included in FCO so far. These are multi-nutrient carriers comprising of primary, secondary and micronutrients as per the need of the area and crop. Production and sale of these fertilizers are dwindling and only two companies are in business now.

Use of bio-fertilizers can also supplement N, P, K, Zn requirement of crops. There are 11 bio-fertilizers in FCO, 1985. In 2021-22, about 1.69 lakh MT of carrier based and 2.33 KL of liquid bio-fertilizers were dispatched in the country. Liquid formulations of bio-

fertilizers have been increasing due to better shelf-life and crop response. In case of organic manures, 10 products are specified in FCO. Organic manure-based fertilizers improve chemical, physical, biological properties of the soil and need to be given more importance along with chemical fertilizers. In view of non-availability, the data for use of organic manures are not given. Four beneficial element fertilizers containing silica are also included in FCO but data for their sale is not available.

Bio-stimulants have been included under schedule VI of FCO in 2021. As per clause 20C of FCO, eight bio-stimulants have been classified. Bio-stimulants can be a substance or microorganism or a combination of both, prime function is to promote physiological process in plants to enhance nutrient uptake, growth and yield. There seems to be a good scope for such products in agriculture.

IFFCO took the lead in application of nano-technology in agriculture by introducing nano urea (liquid). Nano urea was included in FCO in 2021. More than 5.5 crore bottles of nano urea (liquid) each of 500 ml have been sold so far by IFFCO. Further, nano DAP has been included in FCO in 2023. IFFCO is engaged in production and sale of nano DAP and more than 7 lakh bottles have been sold so far. Another grade of nano DAP is likely to be produced by Coromandel International Limited shortly. Sulphur Coated Urea (urea gold) is being introduced in the country and its nutrient use efficiency is more compared to neem coated urea. RCFL has developed this technology and early to start producing urea gold.

The problem of imbalanced use of NPK nutrients in the country is well documented and varies from state to state. In some of the states, the ratio is quite wide with respect to these nutrients. In addition, scarce use of secondary and micronutrients is a big challenge. This is leading to low nutrient use efficiency. Having explained above, alternative fertilizers will help in addressing many of these issues such as micronutrient deficiencies, soil health, low crop response and imbalance use of fertilizers. Therefore, collective efforts of extension agencies of the state governments, ICAR-KVK, SAUs, NGOs, industry and other stakeholders are required to promote alternative fertilizers along with the conventional fertilizers for better nutrient management and farm productivity. Thus, farmers' will have additional benefit of improving their income. Adoption of alternative fertilizers will go a long way for sustainable agriculture. ■