POLICY PAPER 2

Fertilizer Policy Issues (2000-2025)

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Introduction

By the turn of the century, India's population is expected to cross the one billion mark. Pragmatic assessments reveal that between 220 and 240 million tonnes of foodgrains will be required by 2000. With the current food production around 190 million tonnes, India has the compulsive need to raise its foodgrains targets at a rate of more than 6 million tonnes per annum. This obviously is a daunting task. However, in view of our past achievements, and resilience of the system, there is no reason why this phenomenal acceleration in food production cannot be achieved. Technological adoption, using required inputs, especially seeds, fertilisers and water, would be the major determinant of food growth in future. Among these, the most costly input would be fertilisers, whose judicious and need-based use would trigger the process of accelerated growth in Indian agriculture in the coming decades. As such, need for a national policy on fertiliser use, especially considering the emerging paradigms of productivity, profitability and sustainability becomes highly relevant at this juncture. In view of this, the National Academy of Agricultural Sciences (NAAS) based on the discussions of a symposium organised by it in 1996 developed the following policy issues on fertiliser use for the years 2000-2025.

An Assessment of Future Needs

In view of shrinking land and water resources, the singular option for India to meet future challenges on food, fibre, fuel and other needs is through increase in productivity. The only way to achieve this goal is through the scientific and need-based use of fertilisers.

Whether it is irrigated or rainfed agriculture, plant nutrient deficiency is the main impediment to agricultural production. The only way of alleviating this constraint is by increasing the use of fertilisers and manures. The current gap between annual drain of nutrients from the soil and inputs from external sources is 10 million tonnes, which is likely to grow further. The low organic matter content of our soils and poor prospects of recycling of crop residues, add to the importance of inorganic sources of fertilisers in Indian agriculture.

No country in the world, developed or developing, has been able to increase agricultural productivity without expanding the use of fertilisers. India cannot be an exception to this phenomenon. We believe that the future of productive and sustainable agriculture in India lies in increasing the amount and harmonious use of nutrients through inorganic, organic and biological sources and enhancing their use efficiency.

There is a great concern about the adverse effects on soil health as well as productivity due to widening ratio of N:P:K (8.7:2.5:1.0 in 1995-96) due to unsound policy decisions taken earlier, favouring prices of N and ignoring P and K. This has now been corrected to some extent. But without wholesome policies on pricing of fertilisers and of the agricultural commodities, with long-term perspective in view, the impending disastrous effects of nutrient imbalances cannot be ruled out. We feel that steps should be taken to narrow down NPK ratio to 4:2:1.

Keeping is view the conservative population estimate of 1.4 billion and minimum foodgrain need of 301 million tonnes by the year 2025, it will be necessary to use 30-35 million tonnes of NPK from fertiliser carriers and an additional 10 million tonnes from organic and biofertiliser sources. Thus, it will be essential for India to raise the consumption and production of chemical and organic sources of plant nutrients by 2025, to meet these goals. It is interesting to observe that China is already using more than 30 million tonne nutrients from fertiliser sources, whereas in India, we are consuming 13.8 million tonne nutrients with indigenous production of only 11.36 million tonnes. While in 1994-95, China used 309 kg NPK ha-1, India used merely 73 kg ha-1 of gross cropped area.

The disparity in fertiliser use in different agroecological regions is the principal cause of the vast differences in crop yields. For example, Assam is using 12.8 kg NPK ha-1 as against 167.3 kg ha-1 in Punjab. Strategies and policies are needed to remove this inequality in fertiliser use. Without changing this situation, Indian agriculture cannot realise its full growth potential.

Fertiliser research agenda must change its focus and orientation. Emphasis should be as much on improving fertiliser-use efficiency as on its productivity, profitability, sustainability and eco-friendliness. Though about 70 per cent of fertiliser used in India consists of nitrogenous fertilisers and 80 per cent of it is urea, its use efficiency is hardly 30-50 per cent. The losses of N through nitrification, denitrification, ammonia volatilisation, leaching, and surface runoff are very high, particularly in the rice-based cropping systems. Both research and development agencies need to intensify their efforts in popularising the technologies on increasing fertiliser-use efficiency and minimising N losses. Models of integrated nutrient management for diverse but well-defined agroecological zones and cropping systems should be developed, to provide guidance for rational and efficient fertiliser use.

Organic Manurial Resources

Past impassivity in exploitation of the potential of organic manures, composts and agricultural wastes and their synergistic effect with chemical fertilisers must give way to responsive and more vigorous strategies on their use.

Our soils have very low organic matter content. Therefore, without regular application of organic manures and recycling of crop residues, we cannot hope to maintain and sustain productivity and ensure high responses to NPK fertilisers. We need policies and strategies to prepare and distribute for use in agriculture, bulky organic sources of nutrients after enriching them with chemical fertilisers and using modern technology for reducing their bulk. This assumes greater significance in the coming years as with rapid urbanisation the bulky organic wastes are increasing and their disposal and profitable use in agriculture in rural areas is hampered because of transportability and cost constraints.

Green Manuring and Incorporation of Legumes

The green manuring practice besides improving N economy also has many other beneficial effects on soil health. Greater potential of green manuring lies in humid, sub-humid areas and in plantation and horticultural crops. It is also promising for agroforestry and under irrigated farming, specially in intensive cropping systems based on sugarcane,

rice, potato, etc. It can result in saving of 40-60 kg N ha-1. In dryland agriculture the legumes as a part of the crop rotation, as sole crops, intercrops and relay crops, are important both for improving productivity and sustainability of agriculture. Location-specific technologies and strategies need to be developed for different agroecological regions depending on availability of water, labour, seed and the critical period in the cropping systems. Special drive on production and distribution of seed of crops for green manuring is emphasised.

Biofertilisers

The responses to biofertilisers are environment, crop and management specific and generally vary: Rhizobium > blue green algae> azospirillum > azotobacter > P solublisers. Their use in soils of low fertility and for those areas and systems which use low amount of fertilisers is most relevant and needs encouragement. The use of BNF is for partial replacement of nitrogen fertilisers and can result in saving of 20-40 kg N ha-1 and this is not able to meet the full requirement of N for high yields. Moreover, unless the quality of biofertilisers and their shelf life are improved and deterioration in the quality during storage, transport and distribution is minimised, the desired results cannot be realised. Intensive research using biotechnology and other emerging frontier sciences is needed to develop more efficient biofertilisers, to supplement the fertilisers for productive agriculture.

Rhizobium cultures are most relevant to legumes and their greater benefit can be realised in environments where such crops and their varieties are newly introduced, e.g. soybean and berseem, and N status is low. The blue green algae and azolla to rice-based system, VAM-micorhizae fungi for tree-based system and phosphorus solubilisers for high phosphorus fixing soils, are most relevant.

Phosphorus and Potassium (P and K)

Soil test summaries show that 50 per cent soils are low and 48 per cent medium in available P and 13 per cent low and 53 per cent medium in available K. There is also growing evidence of increasing deficiency of P and K, aggravated by the disproportionate application of higher doses of N in relation to P and K. The recent aberration in prices of fertilisers has also changed the NPK ratio of fertiliser use from 5.9:2.4:1 in 1991-92 to 8.7: 2.5:1.0 in 1995-96 indicating less use of P and K. This unhealthy trend, needs to be reversed through development of appropriate strategies and policies to avert disastrous consequences.

Sulphur

There is a growing evidence of increasing responses to S for oilseeds, pulses and legumes and high-yielding cereals. Presently, the gap between S removal and its addition to the crops is estimated to be about 0.5 million tonnes available S equivalent and it is likely to go beyond 2 million tonnes by the year 2025. Strategies and policies need to be developed to reduce this gap and to encourage more use of S either through fertilisers containing S as component or by-products of fertilisers and sugar industry such as phosphogypsum and press mud, respectively. Pricing structure of S containing fertilisers, also needs consideration.

Micronutrients

The micronutrient deficiency in crops is growing rapidly both in extent and intensity with the Green Revolution and it has been observed that 47, 4.8, 11.5 and 4.0 per cent soils are deficient in zinc, copper, iron and manganese, respectively. The deficiency of boron and molybdenum also have been recorded in many areas. The deficiency of Zn is the most widespread, followed by that of iron, copper, manganese and boron and it is anticipated that with higher yields and more intensive agriculture the micronutrient deficiency will increase both in amount and extent. Estimates based on sufficiency approach show that the requirement for zinc will be 324, iron 130, copper 11, boron 3.9 and manganese 22 thousand tonnes by the year 2025. Except for Punjab and Haryana which used about 4000 tonnes zinc and 120 tonnes iron, during 1995-96, there are no statistics available about the amount of micronutrients being used by other status though the fact remains that many of them are using various amounts. While serious efforts are needed to collect the reliable data about micronutrient needs and use, the policies and strategies are required to ensure availability of necessary micronutrient carriers and to protect farmers' interest and environment. It also needs to be stressed that, through increased use of organic manures some of the micronutrient requirements can be met.

Soil Amendments

Gypsum for alkali soils and liming material for acid soils are undoubtedly the most needed amendments. Strategies and policies are required to encourage the use of these amendments or other alternative sources to ameliorate and enhance the productivity of these problem soils. The critical aspects such as transport facility and incentives for use of these amendments need special attention.

Soil Testing

India has a network of about 472 (mobile 94) soil-testing laboratories. However, there is sufficient room to improve the quality of advice and impact on rational use of fertilisers. A critical review of soil-testing system is warranted. Strategies and action plans are necessary to modernise and improve the quality and service provided by soil-testing laboratories. Soil testing should include plant tissue testing also to provide advisory service for general as well as for specialised farming including horticulture, floriculture and plantation crops. Selected laboratories should be developed for such exclusive advisory service in each agroecological region on payment basis. Initiation of a national networking arrangement is absolutely essential and the Indian Council of Agricultural Research (ICAR) should be encouraged to provide the leadership for quality control and advisory service backup.

Fertiliser and Soil Health

The critical analysis of the presently available information gives little evidence of any deterioration of soil health or pollution of groundwaters under balanced and integrated fertiliser use. However, possibility of any ill-effect arising from a long-term unbalanced fertiliser use, such as N alone must be guarded against.

Indian soils are of low fertility and productivity and also assuring national food security demands, balanced and integrated nutrient use as well as monitoring changes in soil health. Thus, building up a national networking arrangement to coordinate the studies on fertiliser use and soil health in different agroecological regions is of highest priority.

Fertiliser Pricing Policies

The *ad hoc* changes in pricing of fertilisers, subsidies and decontrol of P and K fertilisers caused a sudden and disastrous effect on the ratios of consumption of NPK. A long-term sound policy and mechanism to encourage fertiliser consumption growth, and balanced and efficient fertiliser use, needs to be developed.

The question of subsidy on fertilisers should be viewed from a national perspective of food security, nutritional security and national independence. A gradual change is preferable to sudden *ad hoc* change in subsidy. There is need for a critical review of pricing policy on fertilisers, agricultural commodities and of subsidy by a panel of experts, agronomists, soil scientists, plant scientists, agricultural economists, fertiliser industry and farmers' representatives.

In view of the special case of phosphates and potassic fertilisers, the suggestion is reiterated to make long-term contracts with the exporting countries for their uninterrupted supplies at affordable prices. We believe that the need for import of phosphate and potassic fertilisers will continue to increase in future and there will always be a crisis in meeting the growing fertiliser needs.

Strategies and policies have to be evolved for assured and regulated supplies of essential quantities of nutrients both from internal and external sources as the future of agriculture depends on them.

Fertiliser, being the key to national food security and agricultural development, must get the highest priority in any strategy of national planning.