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Fertiliser use and productivity — I

Learning from the Chinese example

Given the strong link between nutrient use and crop productivity, it is the availability of phosphatic and potassic fertilisers in large quantities that has helped the country achieve greater productivity, and thereby reach targeted foodgrain production levels, say **Pratap Narayan** and **Uttam Gupta.** They argue that, as the soil has been stripped of its nutrient reserves through long and intensive cultivation, and as organic sources are quite inadequate, chemical fertilisers have to be relied upon.

HAVING achieved a measure of self-sufficiency in foodgrains production, doubts have been raised about the advisability of continuing with the policies and programmes which facilitated this achievement. Increasing fertiliser use, which has been crucial in revolutionising Indian agriculture and in accelerating our advance towards the goal of food security, has been criticised for quite some time now.

Environmentalists find fault with this because of the alleged adverse effects of land, water and air pollution; the macroeconomic policy-makers decry it because it means an increasing subsidy burden on the exchequer and planners see support to fertiliser sector development as an inefficient allocation of resources. A cross section of economists feel that the excessive use of fertilisers is leading to declining agricultural productivity.

These are highly misleading impressions. Fertiliser use in India, almost negligible in 1951-52, increased to about 72 kg per hectare of arable land in 1992-93. However, it continues to be lower than the use in a majority of countries the world over, with some neighbouring countries such as Pakistan and Bangladesh using 102 per kg per hectare and 111 kg per hectare respectively. Our consumption is even lower than the world average of 87 kg per hectare and the Asian average of 129 kg per hectare. Consequently, there is still a long way to go before we can claim to have a level of performance comparable with other nations.

Why do we need to increase the level of fertiliser use? The answer lies in a strong nexus between crop productivity on the one hand and the supply of essential plant nutrients, primarily N, P and K, on the other. But for the availability of the latter in desired quantities, it is impossible to achieve higher productivity which, in the face of limitation on increasing land area under cultivation, is essential for increasing foodgrains productivity to the targetted levels.

There are essentially three sources of supplying plant nutrients, i. e. i) organic sources such as farmyard manure and crop residue, ii) nutrient reserves in the soil. Because of continuous cultivation for centuries and intensification of agriculture in recent years, the reserves in the soil have been progressively eroded. Although there is some regeneration through nutrient supply from rain water and irrigation etc., considering the substantial removal by the crops, the net result is depletion in nutrient availability in soil.

Even assuming that the soil still has large reserves, capable of supporting increased foodgrain production, which is hypothetical, it is not an ecologically sound proposition to keep on stripping the soil progressively. As regards organic sources, it has been estimated that a maximum of about three million tonnes of nutrients could be made available through this source. There is not much scope that this will increase; on the contrary, it may even decline in view of the increasing demand by households for fuel purposes. Reduction in availability of agricultural land consequent to rapid pace of industrialisation and urbanisation will further aggravate this trend.

Consequently, chemical fertilisers are the chief source to be relied upon. How much attention chemical fertilisers should get and what they can do for agricultural productivity and the overall foodgrains situation in the country can be ascertained by looking at the fertiliser and foodgrains scene in China in comparison to India. The reference to China is important not merely because it has striking similarities with India, particularly in respect of the role of agriculture in the overall national economy, but also because the former's population is already more than one billion; which we shall have by the year 1999—2000. China, in this respect, provides the image of what India would be like by the turn of the century, particularly in terms of the demand for food.

In China, the total land area at about 960 million hectares is almost three times that of India at 329 million hectares. However, the arable land in the former is just about 96 million hectares i. e. 1/10 of its total land area. In contrast, in India the arable land — at 170 million hectares — is more than 50 per cent of country's total land area. Foodgrains production in China during 1992-93 — at about 355 million tonnes — was nearly twice the foodgrains production in India.

How has China done so much better than India despite being at a substantial disadvantage in terms of the cultivable land area? Even in terms of irrigated area, the position in China — at 49 million hectares — is not dissimilar to that in India — at about 46 million hectares. The answer categorically lies in more intensive cultivation, based on higher application of chemical fertilisers.

During 1992-93, the total fertiliser use (all nutrients) in China was 29.2 million tonnes which was 2.4 times the fertiliser use in India at about 12.2 million tonnes. On a per hectare basis, China used 303 kgs of all nutrients, which was also more than four times the consumption per hectare in India at 72 kg. The much higher level of fertiliser use in China has correspondingly led to higher productivity of various crops. Chemical fertiliser use is high despite China using large quantities of organic manure unlike in India where its use is much less. Let us consider rice and wheat, these being the two predominant crops in both China and India.

The fertiliser use on rice per hectare of fertilised area in China during 1992 was 245 kg. The corresponding use in India was 104 kg during 1989-90 (latest available data). However, it is unlikely that by the year 1992 the situation would have improved. Because of these differences, the productivity of rice in China was about 3.8 tonnes hectare of cropped area as against 1.7 tonnes per hectare in India.

The picture in respect of wheat is no different. Nutrient use per hectare of fertilised area in China was 237 kg as against 128 kg per hectare in India. Consequently, the productivity of wheat in China was 3.3 tonnes per hectare as against only 2.1 tonnes per hectare in India.

For coarse cereals e. g maize and sorghum also, the productivity levels in China were significantly higher than in India. The yield of sorghum in China was 3.6 tonnes as against only 0.9 tones as in India whereas, for maize, it was 4.5 tonnes in China as against only 1.6 tonnes in India.

Notwithstanding the already high levels of fertiliser use, i. e. 303 kg per hectare, China is aiming at further increases to meet its increasing foodgrains production requirements and prevent heavy dependence on imports. It may be mentioned that during 1994-95 China imported significant quantities of foodgrains to supplement the already high level of domestic production for meeting the demand.

Presently, China produces about 2.8 million tones of fertilisers as against a consumption of 29.2 million tones. It is proposing to raise domestic production to about 30 million tonnes by the year 2000 AD with a view to meet the increasing demand.

(To be concluded)

(Pratap Narayan is Executive Director and Uttam Gupta is Chief Economist with the Fertiliser Association of India.)