Management of agricultural resources to ease domestic food price inflation

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PRIORITIES

- Improving the agricultural productivity of the land that is already under cultivation and lands which were considered in fertile, poor and degraded.
- Improving the efficiency of agricultural inputs such as fertilizers and water and minimum use of other agrochemicals.
- Reducing soil erosion and surface run-off by efficient soil and water management systems.
- Monitoring changes in the productivity of soil/plant and developing a system of warning treatment and care
- Raising productivity through increased government investments in the food crop sector.

The steep rise in global food prices, in the region of 40% in 2007, further aggravated by the spiraling prices of crude oil, now around U$115 per barrel, has exerted upward inflationary trend in many countries. The FAO says this has triggered food crisis in 37 countries.

Inflation in our country had been at 24% in March 2008, an increase of 28% from 18.8 percent in December 2007, while the annual inflation rose to about 17.7 percent.

Economists forecast that inflation would decelerate to around 16 to 20 percent at the end of the first half of 2008 and to about 10 to 12% at the end of the year. This prediction is based on the assumption that international commodity prices will come down and remain stable, an imaginary assumption that is very unlikely to remain valid.

This subject had been discussed at unprecedented levels, in recent weeks mostly by economists. Let us therefore look at this problem from an Agricultural / Scientific perspective.

Food price inflation

This new situation appears to be as one of "good bye" to low food prices. In fact the trends in rainfall and changes in weather conditions owing to global warming are a long term threat to food prices.

It is unfortunate that millions of poor and middle class people in the country are driven to desperation with the rising inflationary trend. It is the current high food price inflation that has really affected the poor people in this country. Poverty reduction drive has no meaning unless urgent remedial measures are adopted to tackle the crisis.

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Among the many challenges faced by us today, the most urgent need is therefore to produce more from less and less to meet the ever rising food prices and shortages. This calls for careful consideration and thoughtful planning of the use of our limited agricultural resources to boost food crop production.

Science and Technology

The impact of the use of Science and Technology in Agriculture had been felt through achievements in scientific research in crop and soil science, fertilizer use and water management either to increase production from the land already in cultivation or bring new areas under cultivation and improve the productivity of lands which were considered infertile, poor and degraded.

This had led to dramatic increases in yield and production. We in a developing country who are heavily dependent on agricultural production should capitalize in these advances in crop and soil science. The intensive use of fertilizers, depending on the individual crop's need, and high yielding varieties which have been the symbols of significant progress in the food crop sector, in the past can also become the symbols of further gains to follow, besides other soil management practices.

Soil Conservation

We have become conscious of conservation of human, animal and plant resources, but there is not enough concern about the fast disappearing fertile topsoil which supports all animal and plant life. It is therefore a paramount responsibility of all agriculturists to do something about agricultural soil conservation and imaginative rational use of our ever depleting soil resources. The Indian National Commission on Agriculture reported that out of the 328 million ha of total land area in India, 150 million ha are subjected to serious erosion by water and wind. John Pesek of the American Society of Agronomy stated that the USA was losing 1.2 million hectarés(ha) annually due to erosion.

These estimates appear frightening, but erosion can be minimized though not completely eliminated. Studies done by myself have shown that approximately 620 tonnes/ha top soil can be lost from agricultural land in three years, if the land is clean weeded and kept bare. But it would be possible to minimize this loss to approximately 1.30 tonnes/ha if suitable soil management practices such as mulching and growing of leguminous ground covers are practiced.

Water management

Increasing the productivity of cultivated land is another aspect that needs priority. Lack of drainage and lack of proper nutrient and water management are serious problems. The gulf between possible yields obtained by researchers and innovative growers and actual national averages is very wide. Technically, there are numerous possibilities for realizing this untapped potential. Some crops are grown in the assured rainfall areas where moisture may not be a limiting factor, but in most of these areas, nutrient stress and soil physical environmental stress are the two other important factors affecting yields.

Though water may not be a limiting factor in some areas, a good percentage of rain water is also wasted as run-off, which besides being wastage of the resource, also cause erosion. Thus efficient management of rainwater is an important consideration to increase production and to prevention of soil erosion in these areas. Agro climatologist and soil scientists working together can provide valuable guidelines for making the best use of a given environment. Water, whether too little or too much, is a constraint to crop production. Agriculturists would be expected to adopt appropriate technologies suited to the twin problems of moisture deficit and excess, which often exist in the same soils in the same year.

Strategies

Agriculturists irrespective of their specialization have been concerned with the understanding of process and development of techniques for improving soil environments for crop production. The fuel crisis and its link to the escalation of prices of nitrogenous fertilizers spurs the effort to improve the efficiency of these fertilizers and to find a biological means of augmenting N supply. Use of sulphur-coated urea super-granules and nitrification inhibitors have been recommended by soil fertility specialists.

Split application of fertilizers and use of legumes helped effecting saving on N bills. Application of phosphate to ground covers was found to be an effective means of improving the uptake of this nutrient, than its application direct to the crop. This method of application can give significant residual effects to the main crop.

The use of mycorrhizae for realizing phosphate, from unavailable forms in soils opened up new possibilities for utilizing Eppawela rock phosphate, a locally available source of phosphate. Organic matter chemistry, through use of sophisticated instrumentation, has unraveled the mystery of the relationship between organic matter and nutrient supplies.

The last few years have witnessed great interest in the use of organic matter and agricultural wastes for supplementing fertilizers and improving soil properties. The soil physicists have successfully set up models to trace the behavior and movement of water and solutes in soils to predict the changes in soil environments in response to physical and biological factors.

Acceptance of the U.S soil Taxonomy of soil classification, provides the possibilities of transferring of technology to the same soil families around the world. It would not therefore be an exaggeration to say that agriculturists have responded to the challenges of the times and seem to be receptive in making greater contributions in the future. Expanding fertilizer technology; space-age techniques such as satellite imagery and remote sensing to assess agricultural resources; and genetic engineering have opened up new vistas in soil fertility practice.

Deficiencies

Nutrient deficiency is the major limiting factor for crop production in most of the soils and phenomenal increases in production obtained in the last two decades are attributable to a great extent to the removal of this constraint through use of fertilizers. Whatever strategy for increasing production is adopted, a constant watch on nutrient supply in the soil is needed. There would be a decline in soil fertility unless the input-output relationship is properly balanced. The expected crop yield is a function of soil productivity, climate and imposed management.

As yields increase, larger quantities of all nutrients are required to support growth and development. Similarly, larger amounts of nutrients will be removed in the harvested portion of the plant. Nutrition replacement needs to increase, at a faster rate than uptake and removal due to a limited root area for absorption, the necessity to maintain nutrient supplies at the point of slight luxury consumption and increased losses through leaching and soil erosion. The soil bank cannot therefore remain solvent with this type of balance sheet.

Annuals and perennials

One underlying difference between annual and perennial crops is the required nutrient uptake rate. The annual crop has to establish its root system and absorb an often very large amount of nutrients, within a short time. Perennials have a large existing pool of nutrients, which support growth for a period by interval depletion. For example, mature rubber plantations with agro-forestry system of cultivation are likely to conserve and utilize the reserve nutrients more stringently than other agricultural systems. Nutrient recycling is comparatively efficient with relatively small loss of nutrients through the latex. Further demand for nutrients from trees in tapping are also expected to diminish in view of the reduction in tree biomass, resulting from intensified self-pruning and thinning off of canopy.

Therefore, annual food crops are more critically effected by interruptions in nutrient flow. Soil and plant analysis is an effective technology to monitor the nutrient requirements of crops. Growers should be provided with this service by public sector organizations in the food crop sector.

Fertilizer efficiency

Even where fertilizers are applied, their use may not always be efficient, thus another problem which we have to take note of is the low efficiency of applied fertilizers. Realizing that N is the most expensive input and its manufacture requires a large amount of energy, agriculturalists should give top priority to improving the efficiency of this fertilizer and to supplementing it through biological N fixation and organic manures.

While chemical fertilizer technologists and organic manure developers have to modify their products to suit the soil, the Agriculturist should modify the environment to improve the fertilizer use efficiency is a high priority. Priority is also needed on usage and possible nitrification inhibiters and ways to prevent ammonia volatilization, de-nitrification leaching losses etc.

Recycling

Inadequate attention is being paid to organic waste and recycling of crop residues. The bio-gas generated from animal wastes and agricultural wastes provides an avenue for augmenting energy supplied and manurial resources for agriculture. It is shocking to see large quantities of straw being burnt in the fields every year. Besides being a loss of valuable nutrients and organic matter for soil improvements, this burning can cause a serious problem of atmospheric pollution and health hazards.

It has been documented that about 500 million tonnes of dung and crop wastes, badly needed for improving the soils are being burnt by the rural people in the developing countries.

Organic manure

Agriculturists are well aware of the many advantages of applying organic manures to the soil. But their knowledge of the various types and techniques of recycling organic waste is still limited. The scientific methods of composting is known, but is not being followed in practice by growers as it is believed to be labour intensive and materials for composting are not available in large quantities. This is not tree. The main organic resources available in agricultural areas such as cattle dung, poultry litter manure, urine and litter, crop waste/ residues like rice straw, poultry droppings sheep and goat droppings, waste from fruits and vegetables, coir dust and rice husk and bran, can easily be used effectively for such purposes.

Farm yard manure is the most important organic manure in the country. It is a decomposed mixture of dung and urine of cattle, poultry or other livestock together with residues from the fodder, and the straw used as bedding. Generally, because of improper storage and composting condition, loss of nutrients takes place by leaching or volatilization. The quantities of FYM produced would depend upon animal population and efficiency with which the animal excreta is collected and preserved. The droppings of different animals have different contents of NPK. It is imperative that the collection and preservation of farm yard manure should be done properly. In addition to farm yard manure, poultry manure is also an excellent source of organic manure.

Storage of farm yard manure in heaps, exposed to sun, air and rainfall accounts for substantial nutrient losses. Appropriate technology is available for rapid composting and growers can reduce nutrient loss and instead recycle in crop productivity.

Green Manuring

A leguminous manure crop may contribute about 30 – 40 kg/ha/year of nitrogen. Green manuring can very effectively contribute to economize on nitrogen fertilizers. Factors like cost and availability of seeds at the right time of sowing green manure crops, availability of moisture for its growth etc., may however have to be sorted out under different agro ecological conditions.

Green manures, when allowed to decompose certainly add the nutrients present in their biomass. This includes bulk of the N they have captured (fixed) from the air and other nutrients that have been absorbed from the soil. Green manuring, apart from making net nitrogen addition, basically recycles other nutrients back to the soil.

Indiscriminatory use

In the past, and even currently emphasis has been and is being placed on increased use of chemical fertilizers and other agrochemicals possibly due to misleading yet, effective sales promotion campaign adopted by large fertilizer and other agrochemical dealers and sales promotion agencies and the conservative approach adopted by agriculturists although indiscriminate use of chemicals fertilizers and these agro chemicals have long been known to increase cost of production, create imbalances and cause environmental penalties.

The cost escalation of chemical fertilizers and other agrochemicals resulting from galloping price increases of crude oil, shifts in governments fertilizer policies through reduction or removal of subsidies, widely fluctuating produce prices and growing concern of environmental degradation, demand that approach should shift to eco-friendly and cost effective agro-technologies to increase crop production/ productivity from steadily decreasing and degrading land resources that places considerable strain on the fragile ecosystem.

Plantations

Plantations also should contribute their share to decelerate the food price inflation by joining in the current food production drive and grow food crops such as fruits and vegetables that are compatible with the main crop. Many options are available.Mixed cropping in plantations is a type of agro forestry system where two or more crops are grown simultaneously on the same land. When scientifically planted and managed it has certain favorable economic, social and environmental advantages.

Alternative approach would be, "Ecological Agriculture" where a separate field with maximum diversity of useful crops for food, nutrition, medicine, fertilizer, fodder, fiber, fuel wood etc that are either directly or indirectly beneficial, are grown.

This is a national problem. With declining food production, escalation in food prices and even serious shortages in some commodities, the appropriateness of maintaining a plantation corporate sector with large tracks of state land in their hands and producing a single export crop, can be increasingly disputed.

Way forward

Thus for optimizing food crop production per unit of land under cultivation, removing of soil constraints to production and using modern technology based on judicious use of inputs assumes highest priority in all areas. In the past, the philosophy had been to modify the soil environment to suit the plants. Because of the technological and economic difficulties of applying this technique in many areas, the new philosophy of tailoring the plant through genetic engineering to suit the environment become necessary and would produce results of practical value. Thus the role of soil scientists and agronomists is to identify and categorize the environment for the geneticist and the plant breeder to develop genotypes suited to each environment and offer such materials to growers

These challenges are common throughout the world; only their intensities and order of priority varies. The strategy for increasing production in our country such, is through economic maximization of productivity per unit area per unit time. In this strategy all three aspects, increasing productivity, restoring productivity and preventing deterioration of productivity, are important.

Any policy decision by the Central Bank and the government on strategies to decelerate the rising inflation, have to go hand in hand with a commitment to promoting food, crop productivity and security.

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