"Intensive Efforts Needed for Food and Nutrition Security"

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After Green Revolution, we thought that we had achieved self-sufficiency and solved our problem of food security. Somehow, the things have changed and there are many challenges and concerns that require our immediate attention. In this context, I draw your attention to the "Vision Statement" adopted by all the science academies in India and released by the Hon'ble Prime Minister Atal Bihari Vajpayee during the Indian Science Congress held in January, 2001. It's theme was on food, nutrition and environmental security. We need to continuously discuss this issue as we move along. In India, the ever increasing population in fact nullifies all our efforts. Every year we add one Australia to our population needing additionally 4 to 5 million tons of food grains. Many countries don't have such challenge, even China is now better off in that context. We have 16% of total population sustaining on only 2.8% of global land. It is anticipated that we may even surpass the population of China by 2020. We have to realize that India also has almost half of the livestock population than that of our human population. No where else this type of pressure per unit land is being faced currently.

Over the years, per cent GDP from agriculture sector is declining. This indeed is a good sign since industrial growth in the country is showing upward trend. However, it is well established that unless we have 4% growth rate from agriculture, expected 8% industrial growth would not be possible. So, agriculture is the backbone for India's overall development. In rural India, almost 60% of our people are dependent on agriculture alone. Dr. Swaminathan, Father of Green Revolution has often highlighted the importance of agriculture for national food security.

In mid 60s, India was considered a basket case. We seemed to have progressed considerably, thanks to the science based Revolution such as: changing the plant type concept, by making them respond better to higher inputs and giving higher productivity. We had also been fortunate to have the holy alliance of the NARS (National Agricultural Research System) supported well by the policy makers, International Agricultural Research Centers such as CIMMYT and IRRI, and above all our highly intelligent and hardworking farmers.

The green revolution enabled us to feed our population, which is still increasing @ 1.6%. At one time, we were importing more than 10 million tons of foodgrains under PL-480. During past 50 years, we have witnessed unprecedented progress, increased agricultural production at growth rate of 4.5%. Yet the concern is of economic and ecological access to food. Unfortunately, we have not been able to increase buying power, which is why the poverty issue is of major concern.

In the past five decades, there had been steady rise in the prices of most of the industrial products. On the contrary, in agriculture, prices of foodgrains have shown a declining trend, which made the life easier for our people. We have also been able to reduce poverty by 40%. At the same time, life expectancy got doubled from 32-64 years since we became independent. We are aware that despite all these achievements, there are new concerns globally. MDGs (Millennium Development Goals) have drawn our attention towards eradication of poverty and environmental sustainability. Unfortunately, the extreme poverty resides in South Asia. We cannot feel proud on this account despite having done much better on food front. We need to ensure better income for our people and see that they are above poverty line and have easy access to food.

The present global concerns are about 180 million children severely underweight for their age, over 800 million chronically undernourished children, 400 million women of child bearing age being anemic and over 200 million children being vitamin A deficient. Thus, nutrition security has become a major concern which need to be addressed. Also the poverty concentration is maximum in the South Asia. Yet the donor organizations appear to be laying major emphasis on Africa. Asia is not taken seriously just because we had witnessed Green Revolution. Though around 200 million people are still below poverty line (getting less than dollar a day), yet our per capita calorie consumption is higher than many countries in Africa and parts of Latin America. At the same time, we need to move forward from present availability of around 2000 kcal per person to a level of about 2500 or 2800 kcal. This would demand an expansion of our food basket so as to reduce dependence on cereals. We have also been experiencing factor productivity decline on account of second generation problems of Green Revolution such as: salinity, lowering of water table and increased incidence of pests and diseases.

Lately, due to policy changes, the buffer stocks have also depleted. From over 58 million tons in 2002, our buffer stocks went down to almost 15 million tonnes. Due to global decline in production of foodgrains, the prices per ton of wheat and rice had touched all time

high ($400 for wheat and $900 for rice) by late 2008. This has obviously affected the consumers badly.

Lately, the foodgrains are also being diverted as feed, thus making their availability even more difficult. We in India are fortunate due to being vegetarian. Our protein demand is mainly through pulses, vegetables and fruits and not meat. Lately, USA is diverting its maize production to the level of 33% towards bio-fuel production, which appears to be ethically wrong.

Climate Change is also affecting us. It is known that from 1920 to 2000, average global temperature has risen by almost 1 degree, which is expected to rise by another 4 degrees if no corrective measures are taken. Imagine what will happen if that really happens. Impact of climate change is now real. Emission of green house gases (GHG), leading to global warming, more intense tropical cyclones, faster wind speeds and heavy precipitation are all a reality. Contraction of Himalayan glaciers by almost 17 kms in the last 10 years is another reality. As stated earlier, the world cereal production has also been affected adversely in the recent past due to drought in Australia, Canada, US and other developing countries. Recent studies predict that 2250 million tons of cereals will be produced this year but most of this increase is going to be from the developed countries.

In India, the prices are going up, buffer stocks are depleting and imports from developed world are on rise. We must, therefore, think seriously to remain self sufficient. As such, the subject of this seminar to have self-sufficiency at the national level is indeed very important.

We had to import wheat in 2007-08, for the first time after Green Revolution period. We produced around 4 to 5 million tons of wheat each year for over a decade upto 2002. Somehow, during the last 6-7 years, our production has remained stagnant. Fortunately, the minimum support price (MSP) for wheat was increased from Rs. 750 to Rs. 1000 per ton in 2007, which resulted in increased wheat production by almost 3 million tons just in one year. So, the issue of sufficient production and self sufficiency depends on right policies. In recent years, demand for other commodities is growing much faster than cereals, which is a fairly good sign.

We need to reorient our research for development strategy through twin pillar approach. This will require a paradigm shift of not only having germplasm improvement

(good varieties and hybrids) but also improved natural resource management. Also we need to consider socio-economic aspects and policies around diversification of agriculture.

It is a matter of concern that over the years, the use of germplasm for breeding new varieties of different crops has gone down. This trend is rather global and that's why a global initiative on plant breeding has been initiated by FAO through the support of Gates Foundation with the aim to reverse this trend. It is apparent that some complacency in plant breeding has come. It is because people thinks that biotechnology can solve all the problems. It is important to understand that biotechnology can supplement but can not replace plant breeding efforts. In eighties and nineties, Indian wheat program recorded an annual genetic gain of one per cent per annum. Lately, this is stagnating since release of variety PB-343. The challenge is how to improve the yield further. The same challenge is also now with The International Maize and Wheat Improvement Center (CIMMYT). In this context, advances through hybrid technology are encouraging. Our scientists both in public and private sector came forward to give hybrid technology first in to the world in cotton, pearl millet, castor and pigeonpea.

In case of rice, China was first to release hybrids which now covers 53% area giving more than 58% rice production. An yield gain of 1 t/ha could be achieved through this technology. Now China is developing super hybrid rice targeting yield level of 15 t/ha. This kind of effort is needed in India where rice productivity is still below 3 t/ha. Private sector can play a major role, since public sector has not been able to deliver expected output in case of hybrid seed production. We have 42 million hectare area of rice but hybrid rice area is only 1.2 m ha. Hence, we need to move forward. In the USA, single cross hybrid maize technology provided higher productivity (7 to 8 tons). The Bt hybrid maize can now yield upto 12 tons/ha. Hence, through new technologies are available yet there is need to make available the seeds of these hybrids to the end users.

It was for this reason, a mission project on hybrids was initiated under the National Agricultural Technology Project (NATP), which resulted in the release of single cross hybrids of maize for the first time. As a result, our maize production doubled in last one decade. However, the area under hybrid maize, particularly single cross and quality protein maize (QPM) hybrids, is much low. Why can't it be 70 - 80%? Why is it still 25%? We need to understand the reasons and move forward. For this, we need to strengthen Public Private Partnership (PPP).

PPP is essential for future growth in agriculture. For this, we need to provide enabling environment and government should come out with proper policies and incentives to be put in place for those who perform. There is an obvious need for building mutual trust. This is indeed a grey area for which we need to sit across the table and discuss successful models of PPP and have better understanding. Currently, total acreage under GM crops is around 140 m ha. Presently in India, we have only Bt cotton. In Philippines, Bt corn has already been released as a food crop. Recently, in India, both Bt brinjal and Bt corn have been permitted for field tests. In future, I do not know whether there will again be a resistance for acceptance of transgenic technologies. In any case, these technologies are required in country's interest. Even the Europeans are importing Bt cotton, soyabean and corn for use as animal feed. I don't know why there should be any concern for release of GM food crops in India, if testing procedures are in place. Partnership of *Mahyco* with *Monsanto* coupled with enabling environment created by ICAR (Indian Council for Agriculture Research) and DBT (Department of Biotechnology) both for testing and release led to release of Bt cotton in India. In last 5 years, area has increased from no where to around 8 m ha under Bt cotton. In my opinion, there is no better example than this for such a faster adoption anywhere in the world. As a result, the cotton area increased, production almost doubled and productivity also increased. Currently, cotton export alone is fetching India worth 1.4 billion dollars per year. Before Bt cotton technology, we practically had no tangible cotton export.

There is another approach for enhancing food and nutrition security. This is new area - new crop approach. We all know that both rice and sugarcane were not grown before in the north. Groundnut was not grown in Gujarat, which is currently number one state. Potatoes were not grown in the Indo-Gangetic plains before. Maize in eastern India now gives more than 8 to 10 tons of productivity. Chickpea, a crop of North India, can now be grown in Tamil Nadu because of short duration varieties. So, the research has led to a number of achievements in different commodities and crops. For example, pigeon pea is being grown in North and West, due to release of hybrids and short duration varieties. Niche for soyabean could be found in Madhya Pradesh which is now number one oilseed crop in the country. Dr. Barwale raised a very pertinent point as to why we are exporting soyabean which can otherwise help in ensuring nutritional security. Therefore, until we make use of it as a food source, we better continue with current export of soybean meal worth over US$ one billion per annum.

Finally, we need to move forward and do research in up-stream areas of strategic importance. We have to make sure that our knowledge gets translated into products that can benefit the end users. This is what we call translational research for which we need to work with the farmers in a participatory mode, as was demonstrated through Integrated Pest Management (IPM) in rice in Indonesia. This led to increased rice production and decline in pesticide consumption by 50% within 5 years. We have to understand the problems of our farmers and integrate their traditional knowledge with that of the scientific one. We have to make sure that they are able to use their resources judiciously; just alternate furrow irrigation in cotton can reduce water use by 30%. We need innovative technologies. A decade ago no one thought that in rice-wheat production system one could use zero-till drill and have conservation agriculture. Today, over 2 m ha area in the Indo-Gangetic plains is under zero-till. This success could be extended to a potential area of 8 m ha under rice-wheat in India.

My mention of all these is to convey that we should look for newer options such as precision farming, which is possible through efficient farm mechanization. Farmers are even adopting lazer leveling to improve water use efficiency (WUE). That's where again private sectors role becomes important.

Somehow, over the years, our extension system has also become weak. The dissemination losses are higher due to less competent people involved in extension services. In this context, private sector can again play an important role. For example, establishment of agri-clinics through creation of technology agents who can provide much needed them vocational training for much needed custom hire services to the farmers is an important aspect. The role of NGOs is also to be encouraged in this regard.

It is indeed heartening that recent World Bank report has clearly brought out that there can not be sustained and inclusive development unless high priority and required funding support is given to agriculture. Fortunately, therefore, agriculture has come again up-front despite being neglected in the recent past. We definitely need more capital investment in agriculture, as we did soon after independence. We created a lot of good infrastructure like highest dam, longest canal, best fertilizer factories in the co-operative sector, markets/*mandis* and so on. This could be possible since almost 18% of our GDP was spent for capital investment. Unfortunately, over the last 2 decades, this support has declined to almost 9%. Now we expect the private sector to come forward in building the much needed infrastructure. For this, Government has also to provide enabling environment to catalyse the private sector.

India is also blamed for providing subsidy to our farmers. It must be understood that agricultural subsidy in India is linked to productivity, whereas in the developed nations much higher support is provided for storage, marketing and also the export. Our subsidy is currently, around 6.5%, whereas, upto 10% is acceptable limit by the World Trade Organisation (WTO). Hence, needed support to resource poor farmers must continue in the overall interest of our nation.

Let me conclude by stating that we need not be complacent. We need to continue scaling up our efforts both up stream and out stream. We have to see that technologies reach quickly to the end users. We must build stronger partnership among public and private institutions to ensure this goal. For this, we need policy makers to provide enabling environment and needed support to catalyse the process as a matter of high national priority. All these will help in accelerating much needed productivity growth in agriculture to achieve both food and nutrition security on a long term basis.

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