Strategy for Increasing Productivity Growth Rate in Agriculture[1]

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To attain a sustained growth rate of 8% during XIth Five Year Plan, India must accelerate the pace of agricultural growth from the current around 1% to at least 4%. Hence, a Mission Program for Accelerating Productivity Growth Rate in Agriculture is called for as a matter of priority. It would, therefore, need a dynamic approach oriented towards focussed strategy which is well planned, coordinated and monitored. Business as usual will not work. Concerted efforts would be required for meeting the targets that are achievable but were not so well addressed in the past in a holistic manner.

Following are the **ten** strategic areas alongwith proposed action plans that need to be pursued rigorously on agricultural front:

I. Increased Capital Investment in Agriculture

Capital Investment in Agriculture needs to be enhanced from present less than 10% (during last three plans) to at least 15% (as was the case during the first five plans). Investment on infrastructure in rural areas such as roads, markets, ICT for linking farmers to markets (LFM), watersheds, building of drainage systems in canal command areas, modern silos around big mandis/towns, and building of godowns, cool chains for storage and transportation of perishable items, goods trains and air cargo services for quick and efficient transportation at affordable price etc. would accelerate faster growth in agriculture sector. Public sector investment is

[1] Strategy paper attempted for the Planning Commission, Government of India for the proposed draft XIth Five Year Plan (submitted on 12th July, 2006).

the only option at this critical juncture when expected investment by private sector in this direction is not forthcoming.

II. Supply of Growth Oriented Inputs at Farmers' Doorsteps

Growth oriented agriculture would demand easy access to critical inputs, such as:

1. Supply of quality seeds has to be ensured by enhancing replacement rates of hybrids (100%), cereals (10%), oilseed and pulses (5-7%). There had been no growth for quality/ certified seed production over the last 5 years.

2. India currently uses fertilizers (107 kg per ha), which is less than half compared to China (245 kg). Hence, it is necessary to accelerate the annual mineral fertilizer consumption rate to at least 5% from present 3.5%, and to overcome the existing imbalance of NPK ratio. Fertilizer use has to be based on soil analysis. Against national average, many states such as Rajasthan, Chattisgarh, Orissa, Assam and most of NE States presently use less than half (50kg) the fertilizer rate. These states must make efforts to overcome this serious gap – being major productivity constraint. Major thrust would also be required to overcome micronutrient deficiency, such as Sulphur, Zinc, Iron etc. Also target of at least 5% for biofertilizer use has to be achieved in the XIth plan.

3. Supply of bio-control agents and biopesticides for enhanced use in crops such as vegetables, pulses, rice, maize, sorghum, sugarcane, cotton etc. will need special emphasis;

4. Increased use of efficient farm machinery and equipment for timely operations has to be promoted through large scale fabrication, required subsidy and easy availability. (eg. Zero Till Drill, Raised Bed Planter, Sugarcane Planter, Rice Transplanter, Wheel Hand Hoe etc.). Precision farming is key for future success both under irrigated and rainfed agriculture.

   Note: A well targeted state-wise/ crop-wise action program for input availability has to be worked out and implemented on priority.

III. Improving Productivity

India is No. 1 in milk, tea and pulse production, whereas we are second for wheat, rice, groundnut, rapeseed and mustard, vegetables and fruits (after China). In sugarecane also we are second to Brazil. Also we have the largest cattle and buffalo population, whereas we are second largest in goat population after China and third largest in sheep population after China and Australia.

Ironically, we are much behind in productivity, which has to be increased through efficient management of natural resources and by adopting precision farming practices. Some concrete action would be needed in the following areas:

1. ***India to be No. 1 in Wheat Production.*** Increased wheat production is synonymous to increased food security. Currently, India has become No. 2, after surpassing USA, having almost same area under wheat. India can become No. 1 (over China) in near future (5-10 years) if we adopt an aggressive and well planned strategy for increasing wheat production – using both area expansion and enhanced productivity approach with greater emphasis on eastern and north-eastern region. Adoption of conservation agriculture, precision farming, balanced use of NPK fertilizers, and improved varieties (including higher seed replacement) would accelerate the growth, which is almost

stagnant since last five years. Strategically, increased production of durum wheat in selected states would accelerate prospects for future exports.

2. ***Stabilizing Area and Production of Rice.*** India has the largest area under rice (around 42 mha) with productivity level of around 2 t /ha and production level is almost stagnant at around 85 m.t. since last six years. In China, from around 30 mha area, paddy (not rice) production is at a level of 180 m.t. as against 120 mt in India. The productivity level is almost twice (6 t/ha) compared to India (2.9 t/ha). Major gains in yield have come from hybrid technology in China covering around 55% of area with 1 t/ha advantage over varieties. We have to evolve a new strategy by which area, especially under rainfed rice (having low productivity), could be reduced with simultaneous increase in yield using hybrid rice, IPM and conservation agriculture technologies.

   Main focus should now be on rainfed lowland rice producing states in the eastern region including eastern U.P., Bihar, Orissa, West Bengal and Assam. Fortunately, hybrid rice technology has demonstrated good potential in this region. Also increased use of conservation agriculture (zero till drill), rice transplanter, super granulated urea, IPM (like in Indonesia) etc. would help in stabilization of rice production as well as reduction in the area to be used for crop diversification, horticulture, vegetable production etc.

3. ***Enhancing Maize Production.*** Yield potential of maize can be enhanced significantly by promoting single cross hybrids that are currently available. Since their use, beginning in 2001, the productivity level of 2 t/ha has been attained which amply demonstrates the future potential of maize in India. Moreover, the expansion of area in eastern U.P., Bihar, Jharkhand, West Bengal by almost 1 m. ha during last decade is a positive indication as well. Besides local demand for food and fodder, there is considerable scope for export as animal feed for pig and poultry production in the South East Asia, as well as China. All N.E. States also have good potential for maize production. Maize is seen as a major cereal in future with great potential in global market. A special effort to accelerate maize production would be highly rewarding.

4. ***Sugarcane for Biofuel.*** After Brazil, India is the second largest sugarcane growing country in the world. As against 5 mtrha in Brazil, area in India since 2000 is fluctuating between 4.0 – 4.5 m. ha. While Brazil has exploited sugarcane for biofuel production for running automobiles (almost upto 50%), India has not moved in this direction, mainly because of greater internal demand of sugar. India is having best R&D infrastructure and known globally for nobalization of cane resulting in short duration, drought and disease tolerant varieties that enabled its spread to central, northern and western states. Unfortunately, productivity in major sugarcane states in northern India (Uttar Pradesh, Haryana, Panjab) is even less than the national average, despite availability of good varieties and production technologies. Productivity is also low in the second largest sugarcane growing state of Maharashtra. This scenario has to be changed through a Mission Approach, for which technological options exist.

   In view of spiraling prices of petrol, it is high time to have a policy reorientation towards use of sugarcane for biofuel production. India can become No. 1 country in sugarcane and also biofuel production as scope exists for both horizontal and vertical expansion. There is need to move fast in this direction.

5. ***Increased Productivity of Pulses (atleast to 1 t/ha).*** India is the major producer and consumer of pulses. Unfortunately, productivity is still less than 1 t/ha. Major thrust is, therefore, needed to adopt a comprehensive, well planned mission approach to accelerate pulses production. In this context, the recommendations of an Expert Committee Report submitted to the TMOP, DOAC in June, 2000 need to be implemented without further delay.

   Improved short duration, disease resistant varieties are to be popularized through largescale field demonstrations to overcome existing yield gaps (25-30%). Short duration varieties need to be promoted in new areas such as chickpea in south, urdbean in rice fallows, in coastal region of Andhra Pradesh, Orissa and West Bengal, pigeonpea in the north-west (Haryana, Gujrat and Rajasthan), mungbean in north (Western UP, Haryana and Panjab) etc. Use of sulphur in deficient regions, IPM approach and one life saving irrigation will enhance production substantially. Another good option is use of hybrid pigeonpea technology with greater yield benefits in Gujrat, Rajasthan and Haryana.

6. ***Increasing Oilseed Production.***

   a). ***Soybean.*** In last 50 years, from nowhere, soybean has emerged No. 2 oilseed crop. Beside production of oil, it is fetching India export value of above US$ 1 billion per annum mainly from soya meal. This all could be possible due to excellent coordination between research, development and processing / marketing sector. Lately, a sense of complacency seemed to have emerged. On the contrary, soybean could become No. 1 oilseed in India in next 5 years, provided a major effort is mounted in this direction. Currently, India is No. 5 producer, after USA, Brazil, China and Argentina. Though

area is almost similar to China and Argentina but the productivity is almost half in India (1t/ha). Compared to M.P., yield levels are higher in Rajastan, Maharashtra and A.P.. A little push and coordination will help in accelerating soybean production. N.E. States can also be an important niche for soybean in future but would require advance planning and policy support. Another important policy related issue is regarding use of GM soybean. Major soybean countries such as USA, Brazil and Argentina have gained a great deal from GM technology. Why should India remain behind?

b). ***Groundnut***. Use of improved varieties, higher rate of seed replacement, use of sulphur and plastic mulching, besides IPM, can result in significant improvements in states of Andhra Pradesh, Karnataka, Maharashtra and Madhya Pradesh. Currently, Gujarat, Tamil Nadu and Rajasthan are ahead in productivity. With current area (6 mha), production target of 10 mt can be achieved with well targeted efforts. Orissa and Bihar offer new area options with higher productivity, which also need to be explored. Control of weeds in groundnut, one supplemental irrigation, wherever possible and sowing in permanent raised beds with plastic mulching will make all the difference. These efforts would ensure groundnut to continue being No. 1 oilseed crop in the country.

c) ***Rapeseed and Mustard.*** Expansion of area in eastern States (WB, Assam, Bihar) and north eastern states would help in higher production. Hybrid technology could be exploited in the northern and western states. Support for one irrigation, preferably using sprinklers, higher dose of fertilizers and IPM approach would make all the difference, if Rajasthan, Haryana, Uttar Pradesh, Madhya Pradesh and West Bengal could be catalyzed.

d). ***Sunflower***. Potential of Sunflower has not been fully exploited so far in India. Improved early maturing hybrids of sunflower in northern States such as Haryana, Panjab and Western U.P. can help in accelerating production growth rate. New niche for this promising crop could be Bihar, West Bengal, Assam, Orissa etc. with higher productivity potential. Major constraint is non-availability of hybrid seed for which both Public and Private Sector have to be catalyzed by giving defined targets for seed supply of selected promising hybrids.

e). ***Hybrid Castor and Safflower***. Castor and Safflower are crops of great export potential. These are mainly grown in the western States of Gujarat, Maharashtra and Rajasthan (mainly castor). Promoting use of improved hybrids and, wherever possible, use of one irrigation would make all the difference. Fortunately, good hybrids are now available for large area coverage.

IV. Making Gray Areas Green

In order to achieve Evergreen Revolution, we now need to lay special emphasis on rainfed agriculture so as to make these gray areas green. This is critical for sustainability, improved livelihood and income of resource poor farmers who have no possibility for risk management unless practices of diversified agriculture are adopted – such as silvipastoral approach through crop-livestock integration, agri-horticulture (ex-Maharashtra), agro-forestry – mainly growing of trees around bunds (ex-poplar) or in the fields (ex-khejri). Crop and livestock insurance and linking farmers to markets (LFM) need to be the major strategic policy interventions by the Government.

Rainfed agriculture now demands a paradigm shift towards integrated natural resource management (INRM) – using

conservation agriculture practices (ex: Brazil, USA, Canada), productivity increases through hybrid technology (most rainfed crops such as maize, sorghum, pearl millet, sunflower, castor, cotton etc), in which India is the world leader, have gained significantly in the past. Now with new options of hybrids in crops such as arhar, safflower and rapseed mustard, this option further gets widened – but would require a well planned time bound action for seed availability at farmers' doorsteps. Even subsidized hybrid seeds would be in the national interest – as was the case when we attained Green Revolution (subsidy on HYV seeds of wheat and rice was given).

Timely operations, weed management, IPM, sprinkler or drip irrigation systems, use of bio-fertilizers would also need a coordinated area-wise/eco-regionwise approach. Community management of all watersheds developed during the last three plans would require a re-look and would need technical backstopping by research institutions and SAUs in each region to make them fully effective.

In order to overcome risk factor, crop/livestock insurance and availability of easy credit at low interest rates would demand new policy decisions. Also to avoid distress sale of the produce, LFM approach with greater cooperative efforts on post-harvest processing and value addition will be the best option in future. In rainfed agriculture, as technological gains are relatively small but important, it is critical that technology dissemination losses are minimized and best possible extension services are provided through a new self-employed cadre of "Technology Agents" - by promoting the concept of "Agri-Clinics". New thrust is needed on vocational training of young agricultural graduates and linking their services to the farmers on custom hire basis through bankable projects. Timely and efficient technology dissemination will be the key for achieving Evergreen Revolution. Present efforts of

the Government to have an Authority for Rainfed Area Development – on lines similar to NDDB with greater autonomy, authority linked with adequate resources will go a long way in making the gray areas green. We have already achieved resilience in irrigated agriculture, mainly through rabi production, which has now surpassed kharif production. Taking advantage of good precipitation in many states, we must attain resilience in kharif production as well. For example, much of the rainfall is lost on-farm in the states of Orissa, Bihar and West Bengal for want of field bunds - as practiced in Rajasthan and Gujrat. Most of good quality water is often lost. A simple practice of having just one foot high bund along the fields would ensure almost 80% of on-farm water harvesting in the eastern States – thus avoiding the problems of soil and water erosion, flooding etc also.

V. Emphasis on New Area Approach

Past experiences have amply demonstrated that new area approach can lead to faster progress on account of quick adoption of technological package. Examples are of rice in north India, groundnut in Gujrat, soybean in Mahya Pradesh, maize in Bihar etc. Such an approach is still relevant and can yield greater dividends provided adopted on scientific basis – such as GIS based land use planning for crop diversification. Examples are: hybrid rice in eastern India, soybean in eastern and NE region, sunflower in the north etc, as explained earlier. Scientific land use planning had remained a weak link in the past. This gap needs to be bridged – for which India has all scientific capability and knowledge. A well planned effort will be highly rewarding.

VI. Major Thrust on Horticulture (including Vegetables)

Maharashtra can be cited as the best example for promotion of agri-horticulture in India. Right policy decision, technical guidance

and funding support for initial establishment can make all the difference. Availability of disease=free good planting material of fruit crops, hybrid seeds of vegetable crops, bred by both public and private institutions, opportunities for linking farmers to markets, processing and value addition are all critical for the growth of horticulture sector. India has all the potential to become No. 1 in the world but we have to learn from the experiences of Brazil and China in this sector and evolve a long term strategy with achievable targets.

India has comparative advantage of growing all fruits under different weather conditions (temperate, sub-temperate and tropical). Our spectacular progress in potato, banana, apples, oranges, mango, grapes is reflection of the fact that we could still do much better. We also have comparative advantage of geographic location, good technologies, cheap labor and strong private sector. In the context of globalization, we can accelerate our exports through proper grading, processing, packaging etc, as done by Brazil. We need to be linked with foreign markets – for which currently our embassies even do not have agricultural attachés. National Horticulture Board, NAFED etc. will have to be given new mandate in the present context. Growth rate in agriculture through vegetables and fruits will be much faster. In potato, we can even capitalize by exporting seed, True Potato Seed (TPS) etc. to other countries – as this field in Asia is currently dominated by European countries. We could also accelerate potato production for its exports, since, best possible technologies and short duration varieties are available and India has comparatively high growth rate for potato production than many others at the global level. We could also become No. 2 or 3 in potato production in the world from current 5th position. This would, however, require proper planning and coordination from production to consumption (including export) level. Similarly, although, we are one of the largest producers of oranges most varieties are for table use only, so, there is considerable scope

for diversification of varieties suitable for juice and processing.

Tremendous scope exists for export of vegetables, vegetable seeds, flowers (especially roses, orchids etc.) and pulp of tomato, mango, banana and potato chips, tapioca, sugarbeet etc. to name a few. In brief, one needs to embark upon a "Special Horticulture Production Program" – on lines similar to "Special Foodgrain Production Program" initiated and monitored by the Planning Commission in early nineties with tremendous success.

VII. Promoting Inland Aquaculture

India has done exceedingly well over the last five decades in the field of inland aquaculture. While growth on marine fish production is globally on a decline, including very slow growth in India, we have shown remarkable growth rate (4-5%) in the field of inland aquaculture contributing to almost 55% of total fish production which is around 6.0 mt. This also resulted in a major export of shrimp and fish abroad (around US$ 1 billion annually), which indeed is a remarkable achievement. States like Gujarat, Haryana, M.P., Rajasthan are showing good progress besides, the leading state Andhra Pradesh. Much can be done in this sector but would require special thrust, both, on research and development side – including support for the production and supply of quality seed, rural based fish processing, packing, and cold storage facilities and transportation as well as export promotion/ internal market oriented efforts. Other states can learn from the progressive fish farmers of Andha Pradesh as to how they succeeded in linking with markets in states of West Bengal, Orissa, Bihar etc.

VIII. Capitalizing on Livestock Sector

India has the largest cattle and buffalo population, second largest population of goats and the third largest of sheep in the world.

Total livestock population is around 495 million. We are also the largest milk producers (91 mt) in the world today. Yet, we have not been able to compete globally in the export of milk products, meat and even live animals – as being done by Australia, New Zealand, Holland etc. Today, we also produce 41 billion eggs and have 490 million poultry birds. We need to link farmers to markets – the way it is done in Gujarat – through cooperative movement. Such efforts need to be replicated fast in other states as well. Supply of fodder and feed, use of silvi-pastoral approach in rainfed areas (especially Rajasthan, Madhya Pradesh, Maharashtra, Andhra Pradesh etc), establishment of A.I. Centers, Livestock Clinics, supply of good quality vaccines, insurance of livestock (at least of valuable productive ones), establishment of modern abattoirs, processing, packaging, storage and marketing (including export) facilities would all lead to much faster growth in livestock sector – for which India has great comparative advantage but so far not fully exploited. For example, we should be major producer of Mozarella Cheese, being the largest buffalo milk producer, yet our share in global market is almost negligible.

Another important issue is regarding crop-livestock integration, especially in arid regions. In some areas, such as Rajasthan and Maharashtra, major thrust should be on silvi-pastoral practices using agro-forestry and use of rangeland pastures and legumes, beside drought tolerant shrubs and trees such as khejri (*Prosopis*), babool (*Acacia*), etc. In Rajasthan Canal area, especially Bikaner and Jaiselmer Divisions, a re-look is necessary at arable cropping to be replaced by raising pastures and livestock considering the long term sustainability and profitability. Appropriate mid-course correction through needed policy reforms would be desirable. Also we need to protect and improve our local breeds – being most valuable assets.

IX. Improved On-farm Efficiency and Precision Farming

Most critical factor for faster growth in future will be the input use efficiency. It would demand for timely operations/ precision farming. Integrated Natural Resource Management (INRM) would call for more rational use of water, seeds, fertilizers, pesticides etc. Precision farming through greater emphasis on mechanization (both, in irrigated and rainfed farming systems) would be the major recourse in future. Largescale manufacture of equipment and machinery / tools (such as zero till drill, planters, seed and fertilizer drills, sprinklers, mechanical harvesters, combines and small tools for weeding, harvesting and threshing / cleaning etc.) and their easy availability will help in accelerating future growth in agriculture. Hence, this aspect being in the national interest, should receive priority attention during the next plan.

X. Critical Policy Interventions Needed

For agriculture sector, India has been fortunate in the past to receive policy support at the highest level. First prime Minister, late Pandit Jawahar Lal Nehru had said "Everything else can wait but not agriculture". All his successors have also accorded high priority to agriculture – including the present Prime Minister Dr. Manmohan Singh. Enabling policy environment is critical for future growth and development. It is, therefore, necessary that we continue having appropriate policy interventions in future as well, if we have to attain the growth rate target of 4% in agriculture sector. As such, following areas would need specific attention during the XI Plan period:

1. Enhanced capital investment in agriculture;
2. Creation of enabling environment to link farmers to markets (LFM);
3. Credit availability to farmers at low interest rate;

4. Announcement of MSP well in advance for essential and strategic crops/ commodities;
5. In view of globalization of agriculture, a new policy on agricultural exports to capitalize on our comparative advantages – linked with well organized action plan;
6. Major incentives for greater use of growth linked agricultural inputs (seeds, fertilizers (both mineral and bio-fertilizers), pesticides (both chemical and bio-pesticides), farm machinery and equipment, etc);
7. Continued support for buffer stocking of essential commodities at a threshold level (ex: around 15 million tons for cereals) – with creation of ultra-modern silos and cold storage facilities to avoid any post harvest losses;
8. Insurance of crops and livestock with premium rates that are affordable by the resource poor farmers;
9. Incentive oriented and simplified laws and procedures for the establishment of small scale cooperatives for processing and value addition of their farm produce in rural areas;
10 Accelerated pace for the consolidation of land holdings in states lagging behind so far and future land use planning on the scientific and eco-regional basis.

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