

High Value Agriculture in India: Prospects and Policies

PREAMBLE

Agricultural goods with high economic value are generally covered under high value agriculture (HVA). Transformation in favour of high value commodities (HVCs) is driven mainly due to changing food consumption pattern and income elasticity. Demand-supply balance is crucial for retaining high value status of HVCs. Shifting agricultural resources to higher value options has been the new strategy for the agricultural development in the last decade or so, favouring crop diversification. Demands for fruits and vegetables will continue to grow.

Considering the type of growth that the livestock and poultry sector has maintained, it is the right time to attempt high value animal production to encash both the domestic and export market potential. Livestock is to be seen as the main source of livelihood in semi-arid and arid zones of the country. Recognizing the relatively high growth in fish production, post-harvest technology for fish is another important aspect of high value aquaculture. Globalization may further create opportunities for export of high value commodities.

Under this backdrop, the National Academy of Agricultural Sciences (NAAS) organized a brainstorming session on High Value Agriculture in India : Prospects and Policies, under the Convenership of Dr. S.P. Ghosh. A good number of NAAS Fellows and senior representations from MOA, FAO and others participated in the deliberations. In the session's opening remarks, Dr. Mangala Rai, President, NAAS felt the need of high value agriculture, policy issues related to water, procurement price, value addition, post harvest processing, nutrient based fertilizer subsidy, product marketability beside targetting on the plant molecules in medicinal and aromatic plants. Dr. K.L. Chadha dwelt upon the crop diversification, alternative agriculture, new products, agri-information technology, food safety international standard for organic product, public-private partnership, farmers group organisations, retail chains, biofuel and terminal markets. The brainstorming session had four key presentations followed by panel discussion in an interactive mode among all the participants. The detailed recommendations emerging from the deliberations have been brought out in this policy paper.

1. HIGH VALUE CROPS

High value crops (HVCs) are those which give significantly higher value productivity or net income per unit of resource used for their production, compared to other competing activities. Although demand for HVCs has increased faster than food grains, small holders give prime place to the cereals, particularly rice and wheat, in the cropping system on the consideration of (a) food security, (b) low risk, and (c) easy market access. Small farmers

are also handicapped due to small and fragmented land holdings, meagre market surplus and perishable nature of high value crops. Two major concerns for sustainability of the high-value agri-horticultural crops are: (a) to integrate the small holders in high value agriculture production system, and (b) to ensure remunerative price of their produce on sustainable basis.

As per the Global Hunger Index (GHI), India stands at 94th position out of 118 countries listed and falls under “alarming” category. Population below poverty line being quite high and hungry people being one in four, emphasis on food grain production will be obvious. At the current level of population growth, at least 2% annual growth rate in food production is essential.

Crop Diversification and Growth in Horticulture Sector

Increased share of HVCs in the gross value of agricultural output has been noted in recent years (compound annual growth of 6% for fruits and vegetables, against 1.4% in food grains during 1992-93 to 2002-03). As long as production of HVCs remains relatively more profitable as compared to alternatives, it is feasible to promote crop diversification. Shift of small farmers to high value agriculture depends much on knowledge transfer, development of physical and institutional infrastructures, marketing linkages and credit support.

Two major issues in horticultural development of great economic relevance are: (a) Extent of diversification of cropped area and possible absorption of additional output, (b) Nature of demand of horticultural produce, its response to incomes and prices.

According to National Horticulture Board (NHB), during 2004-05, fruits and vegetables alone covered 11.7 million ha with a production of 150.7 million tonnes. India plans to double the horticultural crops production to 300 million tonnes by 2011-12 with anticipated compound growth rate of 8-9%. In spite of 10 % share in global fruits and 14.4% in vegetable production, only about 2 % of horticultural produce is processed and less than 1% is in the export trade, while about 22 % gets wasted in the marketing chain.

On production side, horticulture is still dominated by the unorganized segment, which includes largely of micro- and small horti-enterprises. Since cultivation of fruits and vegetables (F&V) requires assured irrigation for maximization of production, they face tightening competition among the multiple users of water, including agriculture and other sub-sectors. Drip irrigation in certain states, mainly, Maharashtra has largely helped in maximization of productivity of grapes, banana and some others crops.

On consumption side, traditionally Indian consumers prefer fresh F&V (about 75% of fruits and vegetables are consumed as fresh). Processed products are consumed mainly by higher income group consumers. Post harvest loss is high; transport, handling and storage of fresh produce are difficult, and cost of processed product development is generally very high. A fair balance between processed product and fresh supply, therefore, needs to be

ensured. As urbanization has significantly positive impact on demand of F&V, marketing and trading practices, including retail market chain development are important.

The export of horticultural products is expanding. In terms of total value of export earnings of horticultural products (APEDA listed items), it was Rs. 3036 crores in 2004-05 against Rs. 2560 crores of 2001-02 (difference of Rs. 476 crores). In traditional export items like fresh mango, grapes and mango pulp, there was no significant growth during the period. In terms of percentage total production exported, it was 11.67% in onion, 1.95% in grapes and 0.85% in mango. Considering the fact that India is the largest producer of banana and mangoes, the second largest producer of onion, and the third largest producer of potato, the export share should have been much more.

The major component of export cost is freight, which varies with the distance and the mode of transport. The costs by sea freight is low, but there is a great degree of risk of spoilage of fruits if not exported properly packed. For enhancing export of fresh fruits, improvement in quality standard as well as in post harvest handling is essential.

The Department of Agriculture and Co-operation (DAC) of GOI identified some of the fruits (mango, grapes, litchi, mandarins & Kinnow, cashew, walnut, pomegranate, aonla), vegetables (potato, onion, chilli, bitter gourd, okra), spices (black pepper, ginger, turmeric, cumin, large cardamom) and floriculture crops/items (rose, Cymbidium orchid, Anthurium, cutgreens and dry flowers) for export promotion. In processed products sector, mango pulp, canned mushroom and Gherkins, banana puree, tomato puree, tomato paste, aonla, bael, cashew and apple juice are identified as having good export potentials.

The Government of India has already declared Horticulture industry as a priority area, providing a number of fiscal relieves, thereby encouraging commercialization and value addition to the horticultural products. The Horticulture Technology Mission (HTM) for the Northeast (subsequently covering all hill states in Western regions also) and the National Mission on Horticulture (NHM) launched by the Government of India (ending in 2012), are two well funded programmes to boost the horticulture industry in the entire country.

The amendment of the Agricultural Produce and Market Committee (APMC) Act is likely to encourage the private investment in agri-infrastructure development. For improving marketing efficiency and augmenting modern storage, handling and transportation infrastructures, special schemes have been formulated by NHB, APEDA and others. In the GOI 2006-07 Budget, food processing has been shown as a priority sector for bank credit.

Terminal Markets (TM) are being developed at selected locations under Public-Private partnership. Eight cities have already been identified for this purpose. Such TMs will have collection centres in villages and will be operated by private sector, self help groups, co-operatives or state agencies.

Of late, corporate houses are increasingly getting interested in retail marketing. Contract farming of different types for selected crops under a buy back agreement has also been tried in different parts of the country with varied degree of success. Central sector schemes for construction of rural godowns with 25% back ended subsidy, developing market research and information network (MRIN), venture capital assistance by SFAC to promote agribusiness and APEDA support for infrastructure built up in AEZs and establishment of CPC (Centres for Perishable Cargo) at selected airports for export marketing, are some positive initiatives.

Prospects for High Value Crops

- With the rise in per capita income, demand for fruits and vegetables will continue to grow. Demand projections through 2020 show that diversification in consumption patterns towards HVA products will become more pronounced with income growth and changes in other determinants such as urbanization. Also, globalization may further create opportunities for export of high value commodities.
- In the demand sector, domestic market and fresh consumption would remain in focus. In the event of rise of F&V prices, poor consumers generally reduce their consumption by large proportions and therefore, availability of fruits and vegetables at reasonable price is very crucial from the sustainability point of view.
- Further growth in HVC production should come through enhancement of yield per hectare through knowledge and technology transfer, and not from area expansion through diversification of cereal lands.
- The niche potential of marginal mountainous lands if properly nurtured, can bring fortunes and can convert the non-viable subsistence farming to viable farming. Similarly, horticulture based land use is being increasingly considered in developmental plans both in arid and semi-arid regions. Coastal areas are already utilized for plantation crops and spices, while further growth is possible in coastal eco-region with technology backstopping. In the North-East region, agri-horti systems have already been recommended as an alternative to shifting cultivation.
- In the area of R & D, already strong research base has been created, and with proper technology transfer, fast track development of established crops should be possible. Remarkable achievements in certain crops like onion and grapes venturing to successful export have already been recorded. As horticultural crops require assured irrigation for realization of full benefits, investment in micro-irrigation / water management would be crucial.
- Functioning of internal markets are likely to change after amendments of APMC acts. Processing sector is growing and demands for fruit drinks is on the rise. Corporate sector will be increasingly involved in horticulture trade. Notwithstanding high risks in production of F&V, income potentials for HVC farmers are high.

Policy Recommendations

Policy support is needed for continued and sustainable growth of HVC production and profitable marketing of the produce. Major policy areas to be addressed are:

- ***Desired level of diversification:*** Demand for cereals is growing due to population growth and import is not a viable option because of high overseas price. Due to sharp rising food prices, price volatility and yield plateauing in major cereals, further diversion of food grains/cereal land is unlikely and undesirable. Fruits and vegetables showed compound annual growth at 6% during 1991-92 to 2002-03. Consolidation of accrued gains through developing supportive pricing, marketing and trade policies should be aimed first. The required growth rate to meet the domestic demand of major staples is estimated at about 2% per annum, and it is important to ensure availability of required area for the staples by policy means.
- ***Promotion of High Value Crops:*** Gross returns from the fruits and vegetables are much more than the field crop groups. Providing investment grants to farmers, communities and horti-business could help compensate farmers and at the same time, facilitate diversification towards high value crops or horticultural undertakings. As a one time grant, there would be lesser permanent subsidy burden, which would help in containing annual fiscal costs. Hills and mountains, arid & semi-arid regions, and coastal areas do offer opportunities for area expansion under horticultural crops. Rationalization of input subsidies, strengthening of market institutions through promotion of vertical coordination between farms and firms, and reinvigorating R & D institutions need focus.
- ***Improved post-harvest management, Value addition and Marketing:*** For stability in prices of fruits and vegetables, post-harvest infrastructure must be expanded and improved. As processing is becoming increasingly important to help farmers to realize a better price and to even out seasonal fluctuations in production and availability, there is a need to offer fiscal concessions on products manufactured from fruits and vegetables or their parts. Encouragement for preparations of semi-finished or intermediate products at farm, village or tehsil level, and linking these units with modern / advanced units for further processing, packaging and branding should also be attempted. The chain of intermediaries, resulting in low producers share in retail prices (30-50%) can be reduced by expanding co-operative sector (e.g. Safal, Mahagrape) initiatives. Reduction of post-harvest loss in perishable F&V assumes much significance, as for a 22 % physical loss, an average consumers pays a 30% higher. Quality and trade literacy programmes have to be launched across the country.
- ***Credit and Pricing Policy:*** Production and marketing of high value commodities are capital intensive. Financial institutions must play credit support role with easy repayment terms. The National Horticulture Board (NHB) provides loan for hi-tech horticulture.

Improved post harvest infrastructure received focus under National Horticulture Mission (NHM) in the operational area. There is a need to scale up existing programmes and initiatives. Investment in rural infrastructures, in particular roads as well as storage structures, is crucial.

An integration between farm level prices and retail prices is essential. Based on production cost, price parity needs to be worked out for perishable horticultural crops. There is no minimum support price (MSP) for crops other than paddy, wheat, sugarcane and cotton. MSP with its operational part for major HVCs needs consideration. Policy hurdles in enhancing desirable farm-corporate relationship for bringing high quality, and low cost produce on the retail self, need to be addressed.

- **Export Promotion:** The export of HV commodities requires controls on food safety and quality. Both expertise and infrastructures are needed for addressing food safety issues. Market demand for quality produce and low import duties/applied tariff encourage import of HVCs. Reducing bound tariffs for export of fresh fruits and export promotion measures including nurturing AEZs need focus. Food safety management system development and addressing non-tariff barriers, especially SPs issues are major concerns.
- **Policy guidance for Organic Farming:** As per NAAS Policy Paper No. 30, 2005, the Organic Farming strategy should integrate INM, IPM, and enhanced input use efficiency with region-specific promising cropping system. It is recommended that while synthetic pesticides are to be avoided, exclusion of chemical fertilizers is not advisable under all situations.

Generally, the low volume, high value crops (spices, MAP, selected F&V etc.), which can give economic yield even without the aid of synthetic fertilizers and use of chemical pesticides, need to be preferred. The basic standards of production, documentation, inspection and certification, and guidelines for good number of HVCs have already been prepared. They need to be popularized and made more user friendly.

- **Policy guidance for contract farming (CF):** Some established agro-processing players/ Corporate Houses are sourcing raw material from farmers directly. SAFAL/Mother Dairy experiences are encouraging. Some basic requirements for successful CF are:
 - ◆ Development of comprehensive, clean, equitable and farmer centric agreements.
 - ◆ Well-defined clauses dealing with (i) quality standard, (ii) withdrawal conditions, (iii) pricing standards, (iv) paying arrangement, and (v) arbitration mechanism are important.

Enhancement of smallholder competitiveness and increase of labour intensity, both through on-farm and non-farm activities, are possible by promoting HVCs. Domestic market offers a very large potential for fruits and vegetables.

2. LIVESTOCK AND POULTRY SECTOR

Animal Agriculture in India

India has positioned herself very well today in so far as livestock and poultry production in the world is concerned. We are first in cattle, buffalo and goat in the world, housing 16.10, 56.50 and 16.50 per cent, respectively, of world's population. In sheep and poultry, we are 5th in the world, while the position with regard to pig is 17th.

As regards production in milk, it has been growing at the rate of 3.3 million tonnes per annum during the period from 2000-2001 (80.60 million tonnes) to 2006-2007 (100.9 million tonnes), maintaining thereby a steady growth of around 3.72 per cent. In meat production, a growth rate of 5.08 per cent has been recorded during the same period (7.94 % in poultry meat and 2.22% in non-poultry sector). The growth in egg production, has been 5.32% (36.3 billion in 2000-2001 to 50.6 billion in 2006-2007). Per capita availability of milk and egg has also increased from 220 g and 36 numbers to 245 g and 44 numbers irrespectively, during the same period.

Research capacity has been strengthened many folds to address issues like increasing per animal productivity using conventional and molecular breeding, value addition to support services for productivity increase in the form of novel technologies in animal nutrition and animal health protection services. Similarly, massive support is being extended to the processing and value addition aspect of livestock and poultry products including upscaling the skill of the researchers through training in frontier areas.

Prospects for High value Animal Agriculture

Rapid urbanization, higher per capita income, and increase in human population have fuelled the demand for livestock and poultry products which is indicated by the increase in household food expenditure from 21% to 25% in urban and 16% to 21% in rural households during 1983 to 2004-05. The share of export of livestock products has also increased from 3.3% to 6.9% in the period between 1981-85 and 1999-2004. The contribution of livestock sector to agriculture has also increased from 19.8% to 25% in the same period.

National nutrition policy has laid emphasis on protective foods like fruits, vegetables, meat, milk, egg and fish, and Indian Council of Medical Research also has recommended 60 g of protein per person per day. Out of this recommendation, 20 g of protein needs to be met from food of animal origin. Going by the trend of growth in livestock sector, provisioning of the recommended quantity may not be very difficult. The prospect of high value animal production lies in producing superior animals with higher productivity to achieve the target of supplying additional protein to the consumers.

In addition to meeting the protein requirement, the prospect of developing designer animals for preparation of products as per health need, animals (particularly ruminants) that are

environment friendly (less emission of GHGs) with better feed conversion efficiency, and animals that provide safe products for human consumption are becoming brighter in view of increased awareness and enhanced purchasing power of elite domestic and export client groups.

Considering the type of growth that the livestock and poultry sector has maintained and also a shift in the consumption pattern of the urbanized population to have access to high value animal products as well as opening up of the global trade, it is the right time to attempt high value animal production to encash both the domestic and export market potential with an aim to benefit the vast majority of livestock growers in the country.

Policy Recommendations

- In India, the ownership of livestock is much more egalitarian than the ownership of land. The resource poor families own a majority of cattle, buffalo, sheep and goats. Therefore, development of animal husbandry could augment the incomes of small and marginal farmers to a great extent.

The productivity of livestock is low mainly due to inadequate supply of fodder, feed and animal health care facilities, and this requires immediate attention.

- A policy frame on public-private partnership particularly in the areas of service delivery through quality inputs, and technology validation and dissemination is essential to bring improvement in the system.
- A shift to peri-urban production system is needed so as to enforce bio-security, safety and quality food production linking the small holders in the production to consumption chain.
- Arranging certification bodies for semen, embryos, vaccine, germplasm, feed and food will go in a long way. The lessons learned from the improvement in research, management, extension and marketing capacities of private poultry sector need to be replicated in dairy sector, also.
- The meat sector, particularly the male buffalo calves, goats and sheep have tremendous potential. Institutional credit could play a significant role in creating necessary infrastructure, including modern integrated abattoirs.
- Generation of a database on production based identification of quality animals across the zones as well as for quantifying livestock products are to be earmarked for high value production, separately for domestic and international market.
- Setting up of a Livestock and Poultry development board with required autonomy to oversee, monitor, and fund research and developmental programme is desirable. As recommended by the NCF, establishment of Livestock Feed and Fodder Corporations may eventually address the problem of inadequate supply of quality animal feeds.

- Livestock based agro-industries, producing and marketing milk and milk products, leather goods and other byproducts are main source of off-farm and non-farm employment. Livestock is to be seen as the main source of livelihood in semi-arid zones of the country.

3. FISHERIES SECTOR

Status of High Value Aquaculture

People in India have been farming fish since times immemorial. The nation's long coastline, tropical climate, and relatively low wage rates across the globe, provide both enormous physical resource potential and comparative economic advantage for the development of aquaculture. Indeed, many resource management specialists describe India as the potential "fish basket of Asia" in terms of production potential from aquaculture and mariculture. Along with carps that form the mainstay of Indian freshwater aquaculture, giant freshwater prawn and ornamental fish culture in freshwaters, shrimp farming and crab fattening in coastal areas, and mariculture with sea cage farming and lobster culture are attracting interest for high value aquaculture.

In India, the fish industry is expanding fast and is considered to be economically rewarding. India is a major maritime State and an important aquaculture country. Recognizing that fish production has been growing at relatively high rate of 4-5% per annum, the strengthening of processing, value addition, and export of fish and fish products will go a long way to promote fish trade both for domestic and export markets.

High value aquaculture is being discussed in the Indian context in view of the changing paradigms. Yesteryear green, blue and white revolutions aimed at maximizing production to feed the growing population with the underlying motive of self-sufficiency, are the goals of the past. Present World Trade Organization (WTO) and globalization of trade era make profit maximization to the farmer and the nation abiding with the 'law of comparative advantage' more relevant than maximization of production. Hence, agricultural technology platform needs to be taken to the next higher stage viz., from ensuring food and feed security to earning enough foreign exchange to meet the import bills.

Prospects for Aquaculture

As aquaculture production has continued to rise significantly during the past 20 years, Indian shrimp and fish farmers have made substantial contributions to the nation's exports of fishery products. It is estimated that the subcontinent has 1.2 million hectares of brackish water area and 5.4 million hectares of fresh water sites available for the development of shrimp and fish farming. Add to that an abundance of brackish water resources and availability of 8.5 million hectares for sea farming, plus immense manpower resources and world-class processing plants. This is why aquaculture has been repeatedly identified by various policy making bodies in India as one of the viable business opportunities.

Shrimp has been the mainstay of India's seafood exports for some time now, as the nation ranks one of the largest producers of the black tiger species (*Penaeus monodon*). The state of Andhra Pradesh has been in the forefront since the beginning, and today more than one lakh farmers are engaged in shrimp aquaculture, while another 25,000 are practising scampi culture. Infrastructure support such as feed mills, hatcheries and diagnostic labs have been developed accordingly to the support in the industry, and boosting regional and local economies. An extremely positive outcome of India's growing environmental consciousness has been diminished dependence on antibiotics in aquaculture. The implementation of stringent eco-friendly measures has had significant impact on the quality and value of farm-raised seafood.

India stands second in the world with an annual aquaculture production of about 2.94 million metric tonnes, which is about 4.2% of the world's aquacultured fish both in quantum and value. The poor value realization by India is attributed to the low unit value of aquaculture production. Japan, on the other hand, accounted for 2.1% of total world aquaculture production by weight but 6.0 % by value, due to high-value species cultured (e.g. amberjack, scallops and oysters).

Chile leads in aquaculture of high value species. Chile ranks tenth in production volume, but fourth in total value, as it produces high value items with an average value of US\$ 4.05 per kilogram. In 1995, the aquaculture production of Chile was estimated at 2,06,000 tonnes with a value of US\$ 584 million, which included 98 000 tonnes of salmon and 43,000 tonnes of rainbow trout. By 2004, the total production figure had increased to 6, 95,000 tonnes with an estimated value of US\$ 2.8 billion. Of this value, 74% originated from Atlantic salmon and trout culture with an estimated value of over US\$1.5 billion for Atlantic salmon and US\$ 568 million for trout. Thus in one decade, the production of salmon quadrupled to 4, 39,000 tonnes and that of trout, tripled to 1,26,000 tonnes. Other products with estimated production values of over US\$ 100 million in 2004 were Coho salmon (US\$ 294 million), Peruvian calico scallop (US\$ 240 million), and Chilean mussel (US\$ 131 million).

There is a high potential for diversification in aquaculture in freshwater, coastal and marine environments, both for food fish and ornamental fish, as also from finfish to crustaceans and molluscans. Of the 297 globally farmed species, 71 are from freshwater and the rest are salt-tolerant to various degrees. In India, the biodiversity utilization index is low at 0.15 that could be greatly enhanced. Shrimp, sea bass and crabs are immediate potential species. Post-harvest technology for fish is another important aspect of high value aquaculture. Fish being a highly perishable commodity, requires special precautions in handling and transport, to maintain proper hygienic conditions and high unit value realization. Hence, fish processing for consumer convenience is the foremost technology needed for utilizing the fish and shellfish as a high value commodity for domestic and foreign trade.

Policy Recommendations

- ***Diversification of marine fisheries:*** Diversification of coastal fisheries into selective fishing, deep sea fishing and tuna long-lining, installation of fish aggregation devices and artificial reefs, short term forecasts and resource estimation through potential fishing zones, are necessary for achieving sustainable coastal fisheries.
- ***Mariculture:*** In order to complement the stagnating marine fish catches and enhance livelihoods along the Indian coasts, mariculture technologies need to be adopted with due consideration to the prevalent conditions, suitable species and market demands.
- ***Island fisheries development:*** In view of the available resources and their low levels of utilization, greater efforts are needed at developing infrastructure in the island systems of Andaman & Nicobar and Lakshadweep, in terms of fishing harbours, processing and export centres.
- ***Infrastructure development:*** Better fish landing and handling would go a long way in bringing better returns for the produce as also to reduce the presently significant post-harvest losses. It is necessary to equip the existing fish landing centers and harbours with proper facilities.
- ***Establishment of quarantine facilities:*** There is a total lack of quarantine system, resulting in unregulated introduction of exotic fish and shellfish species. A strong quarantine is required both for planned introductions as well as addressing biosecurity concerns.
- ***Aquaculture at par with agriculture:*** Aquaculture potentials could be realized if the segment is treated as agriculture, with regard to water and power tariffs, levies on inputs such as feed, fuel and fertilizers, and taxation on incomes from the activities.
- ***Diagnostic laboratories:*** Intensification of aquaculture practices are raising concerns on incidence of disease in both finfish and shellfish culture systems. It is necessary to provide for diagnostic laboratories in areas with high activities of freshwater and coastal aquaculture.
- ***Coldwater fisheries and hill aquaculture:*** With unexploited potentials in hill fisheries and aquaculture that would also yield high value fish such as trout, infrastructure development in terms of trout hatcheries and farms as also market linkages, need to be given priority.
- ***Domestic marketing:*** With increasing possibilities of profitable domestic marketing in high value commodities, it has become imminent that different models of domestic markets with suitable cold chains are developed. Market intelligence studies, both for international and domestic markets, are essential for ensuring profits to the farmer.

CONCLUSIONS

Diversification in agriculture favouring HVA is to be looked as a means to ensure both food & nutrition security as well as higher profitability. Generally, staple foods are not high value commodities, because the necessity of their consumption leads to demand and supply equilibrium at a relatively low price.

The value status of a commodity depends much on demand and supply. Estimates of growth of domestic demand for high value commodities show that against annual growth rate of population by 1.45%, growth in domestic demands for fruits, vegetables, milk and meat will be 3.34, 3.03, 3.41 and 5.01 per cent, respectively. Further, domestic demand estimates for HVCs show that corresponding to 4.5% growth in per capita expenditure (which corresponds to about 7% growth in GDP) and 1.45% growth in population, demands for fruits and vegetables would increase by 3.0 to 3.4% per year. To ensure required growth rate of 2% for the staple food items, further diversion of food crops land for other alternatives is not desirable.

As drivers of diversification, while in demand side urbanization and income levels are important, in the supply side relative profitability and infrastructures are more important.

As policy guide for agricultural diversification towards high value commodities major strategic actions flagged are: (i) *Adjustment of incentives* (e.g. reform in food grain management, rationalization of input subsidies), (ii) *Reform of institutions* (e.g. strengthening of market, land, credit and pricing institutions, promotion of food safety & food quality, reinvigoration of agricultural research & technology), and (iii) *Increase in investment* (e.g. development of road net work, better electricity supply, tapping IT sector, private investment in developing cool chain, storage structures, retail chains).

For meeting the new demands on agriculture, including healthy foods, environmental services and for addressing concerns like rural employment, higher farm income generation and checking rural exodus, strengthening of institutions and organizations linked with high value agriculture (HVA) is a pre-requisite. Enhancement of small holder competitiveness and increase of labour intensity both through on-farm and non-farm activities are possible by promoting HVA.