

Draft



# Haryana State Agriculture Policy



**Kisan Ayog**  
Government of Haryana

## Haryana State Agriculture Policy

### 1. Preamble

The Indian Parliament approved a National Agricultural Policy in 2000. Later, in 2007, the Union Cabinet also endorsed a National Policy for Farmers. Both aim to harness the vast untapped growth potential of Indian agriculture for accelerated, inclusive and sustainable growth and development leading to improved economic conditions and social status of farmers, agricultural workers and their families. According to the Indian Constitution, agriculture is a State subject, yet many facets of the sector are either in the Central list or under the concurrent list. Often the policies pertaining to agriculture sector are initiated at the Centre, especially to ensure needed support for development related activities throughout the country. Considering the concerns and best interests of the farmers and farm workers, it is desirable that each State formulates an agricultural policy of its own. It is in this context, Haryana Government has decided to formulate a progressive agricultural policy with the help of Haryana Kisan Ayog. Accordingly, this draft document based on comments received from various stakeholders associated with State agriculture has been developed for its submission to the Government of Haryana.

### 2. Agricultural Economy of Haryana

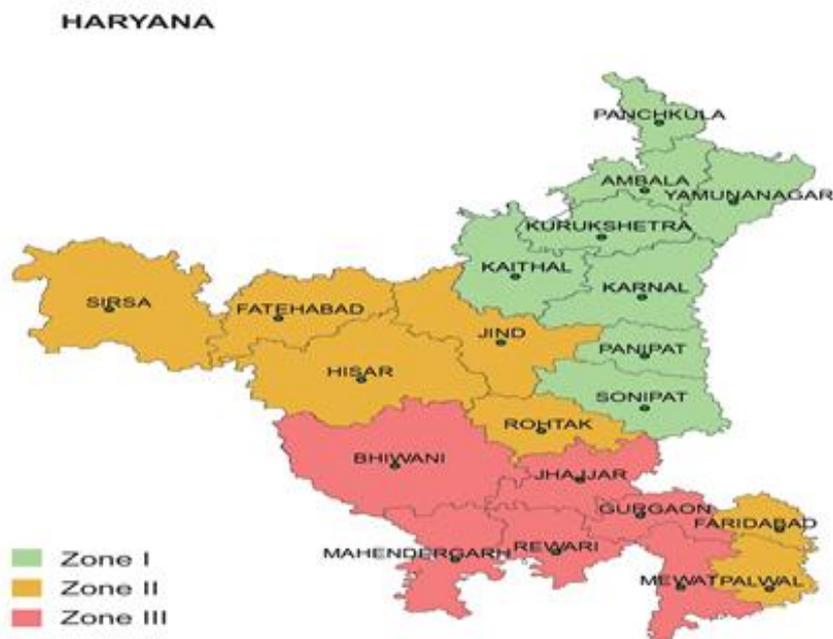
Haryana is one of the smallest States in India with 4.4 million hectares of land, forming 1.34 percent of the total geographical area of the country. Nearly 80 percent of the total geographical area of the State is under cultivation of which about 84 percent is irrigated with cropping intensity of 184 percent.

Based on ecology and cropping pattern, the State can be divided into 3 agro-ecoregions. Zone-I: it consists of 8 districts, namely Panchkula, Ambala, Kurukshetra, Yamunanagar, Karnal, Kaithal, Panipat and Sonapat. This Zone forms nearly 32 percent of the total area of the State. Zone-II: it consists of 7 districts, namely Sirsa, Fatehabad, Hisar, Jind, Rohtak, Faridabad and Palwal. This Zone accounts for nearly 39 percent of the total area of the State. Zone-III: it consists of 6 districts, namely Bhiwani, Mahendergarh, Rewari, Jhajjar, Gurgaon and Mewat. It covers nearly 29 percent of the total area of the State. The area falling under Zone I and II are ideal for crop diversification with wheat, rice, pulses, cotton and sugarcane as well as for raising dairy cows, buffaloes and poultry. These Zones have better irrigation facilities and good overall infrastructure. However, *kandi* area in these zones have serious problem of soil and water erosion and hence they are suitable for agro-forestry and agro-horticulture systems. Zone

#### **Salient Features:**

- *Small but agriculturally important State*
- *Impressive agricultural growth*
- *Rapid urbanization and dietary Changes*
- *Diverse agro-ecology and cropping Patterns*
- *Impressive growth in allied sectors (livestock, fishery, horticulture, poultry etc.)*

III is having major area under pearl millet and rapeseed & mustard and is also suitable for arid-horticulture. Mewat area is more suitable for agro-forestry, sheep and goat rearing.

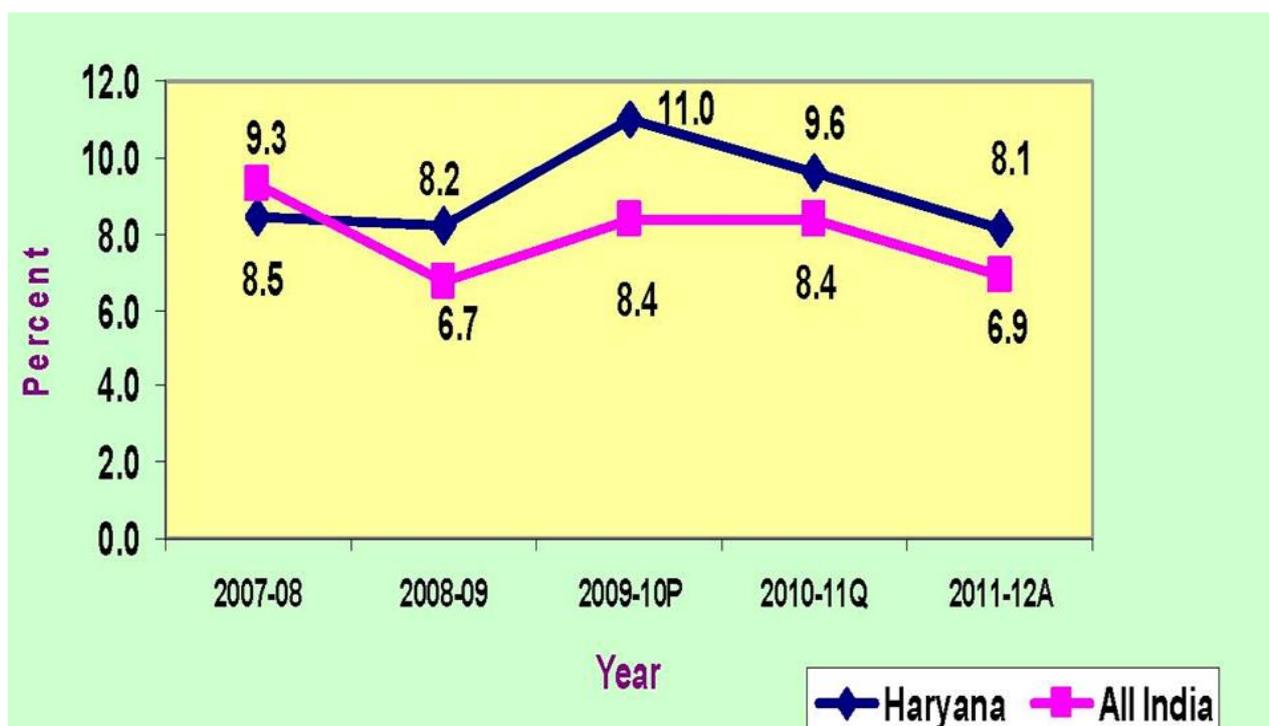


For administrative purpose, the State has been divided into four Divisions: Ambala, Gurgaon, Hisar and Rohtak, with good infrastructure and amenities for general public.

Notwithstanding significant progress in manufacturing and service sectors, agriculture sector continues to play a major role in the State economy contributing about 14.5 percent to its Gross Domestic Product (GDP) as well as providing employment to 51 percent of the work force. Even in case of industrial employment, agriculture based industries account for more than 31 percent. Murrah buffalo and Basmati rice are the pride possession of the State. At present, about one lakh Murrah buffaloes are exported every year to other States and even abroad. The State enjoys 1<sup>st</sup> position in the production of Basmati rice and productivity in pearl millet and rapeseed & mustard. The foodgrain production has increased to 16.2 million tons in 2010- 11, as against only 2.59 million tons when the State came into existence in 1966-67. The State has the distinction of attaining food self-sufficiency in the shortest period. Currently, Haryana is the second largest contributor to the national food basket. Progressive policies and programs, good Research & Development (R&D) system, required infrastructure and hard-working farmers have all contributed to the steady growth in the State. During 2011-12, the GDP growth rate was 8.1% in Haryana, as against 6.9% at all India level. As regards sectoral growth, service sector recorded the highest growth of 10.2% followed by industry (6.1%) and agriculture (5.1%).

The livestock sector contributes to about 30 percent of the State Agricultural GDP and the production of milk and egg has increased more than 5 times and 160 times, respectively since the formation of the State. The State has also great potential for increased production of higher income generating crops/ commodities like *guar*, horticulture, poultry and inland fish. Over 3.99 lakh hectare area has come under horticulture during 2010-11. In the last decade, the State has shown remarkable growth in poultry and fishery sectors. The State is having around 2.88 crore poultry birds for eggs and meat production. During 2010-11, around 9.5 thousand fish farmers covered about 17000 hectare inland water area producing around 94 thousand tons of fish. Since 1966-67, the fish production and productivity has increased many times. Today, Haryana stands second in inland fish productivity in India.

**Growth of GDP of Haryana and All India at Constant (2004-2005) Prices (HES, 2011-12)**



As elsewhere in India, significant dietary changes are also taking place in the State. By 2025, per capita consumption of pulses, edible oils, fruits, vegetables and milk is estimated to increase by 28 to 75 percent. Maximum increase of 156 percent is expected in the consumption of eggs, meat and fish. In future, the supply-demand gap will be significant for these commodities. The population growth is currently 1.7 percent and expected to stabilize around 1.1 percent by 2025. The GDP growth presently is about 7 percent. By 2025, it is expected to increase to 10 percent. About 9 percent of rural families are below poverty line as compared to 5% in Punjab and 24% at all India level. The real per capita income in the State has almost doubled from Rs.37972 in 2004-05 to Rs.63045 in 2011-12.

Over the years, the State has pursued progressive policies relating to enhancing investment in agriculture, strengthening R&D system, public distribution system, Panchayatiraj

institutions, irrigation development, land acquisition policy, subsidies towards credit and power use, infrastructure like road, market, power generation and supply, etc. These progressive policies combined with receptive farming community, immediately adopting technological innovations, have contributed to a very steady growth for the State, in general, and agriculture, in particular.

Notwithstanding these very impressive achievements, the State is facing problems of decreasing size of farm holdings, decreasing cultivable area, increasing soil salinity, declining as well as rising water tables, imbalanced use of fertilizers and micro-nutrient deficiency, harsh climate, low forest cover (3.52%), considerable area still under rain fed farming (about 19%), lack of required processing and value addition facilities, storage constraints and off late shortage of labour for farming operations. All these factors are adversely affecting productivity enhancement. There is significant productivity gap in the field crops, horticultural crops and livestock. The State is deficit in pulses (except gram), vegetables and fruits. There is deceleration in total factor productivity particularly in rice, one of the main crops of the State. A lot remains to be done in case of land reforms, capital investment for infrastructure development, natural resource management, marketing, processing and value addition, improved environmental services, risk management, agricultural credit, insurance and agro-advisory services to the farmers. The State is yet to harness its comparative advantage using its niche for Murrah buffalo (to promote dairying and value added products), Basmati rice, *guar*, mushroom, poultry, fishery, arid horticulture, agro-forestry and agro-tourism. The plight of farmers, particularly small and marginal, women and agricultural labourers, in terms of income, profitability, sustainability and overall livelihood security, is a matter of continuing concern to policy makers, planners and development agencies. In the backdrop of these concerns, the proposed Agriculture Policy of Haryana will focus on agriculture and its allied sectors ensuring enhanced investments, increased production, productivity, sustainability and profitability. Such a policy, once in place, will trigger the process of accelerated, sustained and overall growth with human face.

### **3. SWOT Analysis**

#### **3.1 Strengths**

Haryana, with its rich cultural heritage, is a land of warriors and hardworking farmers. Mixed farming is a way of life and the State is known for its famous breeds of Murrah buffalo and Haryana cattle. Also the climate of Haryana is uniquely favourable for Basmati rice cultivation. About 2/3<sup>rd</sup> of the State has assured irrigation, most suited for rice-wheat production system, whereas rain fed lands (around 1/5<sup>th</sup>) are most suited for rapeseed & mustard, pearl millet, cluster bean cultivation, agro-forestry and arid-horticulture. The State is also ideally located nearer to National Capital Region (NCR) with access to a range of big markets and the international Airport. Rice, wheat, rapeseed & mustard, bajra, cotton and sugarcane are the major crops with considerable scope for agricultural diversification as well as off farm opportunities. Cauliflower, onion, potato, tomato, chillies, guava and

kinnow are the important horticultural crops having good potential. Allied sectors like dairying, poultry, fishery, arid-horticulture, mushroom farming, bee keeping, agro-forestry have great potential. The land and water resources are indeed valuable and the State is fortunate to have very good cultivable land with high cropping intensity, proper farm mechanization and progressive farming community, especially very hard working women farmers. Rich traditional knowledge and modern farming practices adopted by the farmers place Haryana State in an enviable position. The Government policies are pro-farmer and State has an efficient governance system to support farmers.

### **3.2 Weaknesses**

Rapid diversion of cultivated land for non-agricultural purposes is currently a matter of great concern. Soil health and water quality are declining. Soil organic carbon is low and the organic matter recycling is not practiced as mostly the wheat and paddy straw is burnt in the fields and cow dung is mostly used as fuel. Composting is rarely practiced, most of the animal wastes, an important source of organic matter is generally dumped on the road side. In some areas, salinity is also a concern. In arid region, ground water is mostly brackish and in canal command areas water table is rapidly declining. Also there is partial adoption of recommended technologies and best practices relating to seed treatment, balanced fertilizer use, use of micro nutrients, weed management, efficient water management, green manure, bio-fertilizers, vermi-composting, control of diseases and pests using Integrated Pest Management (IPM) approach, crop rotation, etc. These are obvious weak links for progressive agriculture. Similarly, timely availability of credit and other inputs for agricultural operations and lack of information and effective knowledge sharing mechanisms are some of the important impediments for rapid growth in different sectors of agriculture (horticulture, agro-forestry, livestock, fishery, etc.). The lack of fodder, good quality feed, healthy fish seed are some additional constraints for growth and development of livestock, poultry and fish sectors. The shortage of labour is emerging as a major problem hindering agricultural growth. Lack of storage, primary processing and cold chain facilities, inadequate, uncertain and untimely supply of electricity, inhibition for agricultural diversification as well as for change in food habits are some of the other weaknesses. Relatively less investment in agricultural research and development is also an important factor adversely affecting faster growth of agriculture in the State.

### **3.3 Opportunities**

Proximity to the national capital region (NCR) as well other big cities, the fast growing domestic demand and expanding markets for agricultural products is a rare opportunity especially for the farming community of Haryana. Well-developed research and extension system to bridge the existing productivity gaps in crops, animals and other sectors, developing infrastructure for agro-processing to utilize available raw materials are some of the emerging opportunities that needs to be harnessed. Increasing demand for fruits, vegetables, milk, meat, eggs, fish and other dairy products (butter, paneer, cheese, sweets), due to fast expansion of middle income group, is seen as positive indicator. In addition,

international demand for specialty products such as Basmati rice, Mozzarella cheese, Murrah buffalo germplasm, mushroom, baby corn, strawberry, honey, etc. are some of the emerging highly potential options for increased profitability and income. Linking of markets with producing centres along with existence of International Air Port in the near vicinity offers additional opportunities for exporting to even global markets. Also the fast developing rural infrastructure in the State is an additional asset for fully exploiting the potential of agriculture sector. Existing cooperative societies can also be revitalized for organized credit, marketing and other services in the agriculture sector. Convergence and coordination among research and development organizations, possibilities for diversification in favour of horticulture, especially the vegetables and flowers, livestock, inland aquaculture (in village ponds, waterlogged areas and arid region having brackish water), aiming at growing of high value fish species like mangur, sol, sea bass, tilapia, singara, prawn, etc. will open new opportunities for increased profitability and income. Organic farming is another area for cutting down costs, improved soil fertility and increased farm income. Scope for development of peri-urban agriculture and protected cultivation of good quality vegetables and flowers is another untapped/under-tapped opportunity for the farmers of Haryana.

### **3.4 Threats**

Declining total factor productivity (TFP), rising cost of production and increasing concern on quality of food, increasing international competition due to globalization of agriculture, more area under cereal based (rice-wheat) cropping system, declining acreage under leguminous crops, degrading soil fertility/soil health with low organic matter, sulphur, potash and micronutrients are, indeed, the emerging threats for the State agriculture. In addition, fast depletion of ground water; rising salinity and water table in the arid areas; release of untreated industrial effluent and sewage water in fresh water canals, increased competition for land and water on account of fast urbanization and industrialization are some of the other emerging threats. Invariably, ineffective monitoring and poor quality control on inputs and planting materials, increasing incidence of pests and diseases are also emerging threats. Only selective insurance for crops and livestock and lack of insurance for poultry and fish farming, non-availability of electricity during day time for agriculture, higher rate of electricity and water charges for dairying and fish farming, higher costs of feed and fertilizers, lack of interest of young generation in pursuing agriculture as a profession are some of the discouraging trends, lately.

### **4. Vision**

To ensure overall progress and prosperity of Haryana farmers by making farming efficient, economically viable, progressive, knowledge based sustainable and respected profession.

## 4.1 Goal

The policy aims at three overarching goals to attain inclusive growth exceeding 4 percent in agriculture: (a) Food, nutrition, employment and livelihood security for all (food and nutrition for all), (b) Linking farmers to markets for increased income (prosperity for all) and (c) Sustainable agriculture and environmental security (prosperity in perpetuity).

## 5. Strategies

The four complementing strategies proposed to attain the above goals shall be: (i) Sustainable agriculture, (ii) Productive agriculture (iii) Secondary agriculture and (iv) Innovative agriculture.

### 5.1 Sustainable Agriculture

Natural resource management has to be the number one strategy for accelerating and sustaining agricultural growth in Haryana. In fact, major weaknesses and threats to the sustainable growth in the State are natural resource induced, particularly in the context of soil health, water scarcity and quality, emerging threats due to climate change and biodiversity management. The policy shall aim to promote technically sound, economically viable, environmentally friendly and socially acceptable use of State's natural resources-land/soil, water, energy, agro-biodiversity and climate. Concrete policies and measures shall be pursued to contain/counter increasing biotic and abiotic pressures on natural resources, especially through rational use of land, soil organic content management, optimum use of available water, efficient use of energy, conservation and effective use of agro-biodiversity and mitigating the impact of several existing stresses. For this, programs and policies will be formulated to ensure sustainable agriculture both for the present and for posterity ensuring clean air, water and food to the people of the State. These shall include policies to be formulated in respect of three basic natural resources i.e. land, water and bio-resources.

#### 5.1.1 Land

As land cannot be extended horizontally and its health and fertility is critical for future growth and sustainability, utmost care for its development and scientific use in short, medium and long term perspective shall be the future priority. The land policy and the follow up **Clean and Green Technology** shall define clearly the purpose, limit, procedures and penalty for diversion of agriculturally potential land for non-agricultural/ unapproved uses by the individual owners/community/Panchayat, private companies and Government. Land acquisition policy shall be such that only wastelands are acquired first. Also, there will be clear-cut definition of developmental activities for which land may be acquired. The land settlement rules and procedures will have to be reviewed/reframed as one of the most progressive models in India and implemented both in letter and spirit. Similarly, rules and procedures shall be framed for land/pond acquisition/lease which protects the rights of owners, while ensuring clearly the interests of tenants, use of limited

waste land for afforestation, periodic land valuation, compensation and provision for joint ownership (husband and wife). The encroachment of village ponds for other uses will be prevented/dissuaded. The land ceiling limit (both minimum and maximum) to the individual farmers, cooperative societies and corporate houses has to be revisited and suitably defined for implementation under new land policy. Required uniformity in land rent/tax across agriculture and allied sectors will be maintained. Ensuring land rights to the women will be a State priority. Due attention shall be given to ensure equitable access of common property and wasteland resources to village communities. Farmers (Individually, through self help groups or cooperatives) will be encouraged to establish rural based small scale primary processing facilities on their own land for which appropriate rules and procedures shall be put in place. In order to minimize traffic congestion and to ensure smooth traffic movement, flyover and under passes will be constructed rather than bypasses which generally wipe-out a large chunk of most productive hinter lands forever.

As regards land use in agriculture, there will be high priority for improving the quality of land and soil resources of the State. To address nutrient mining problem, soil maps with high resolution will be prepared once in 3 years to guide nutrient planning including micro nutrient application. In view of low carbon content in the soil, special emphasis will be laid on organic recycling, management of soil microorganisms, soil orthopods and growing pulses. To mobilize resources for enriching soil organic matter, carbon trading will be promoted and the credits earned will be encouraged to be reinvested for

**Land Related Issues:**

- *Good cultivable land be protected from non-agricultural uses*
- *Diversion of only waste and less productive land for non- agriculture uses*
- *Declining soil health needs priority attention*
- *Emphasis on organic recycling and balanced use of nutrients*
- *Rules and procedures for land reforms to be revisited*
- *Scientific land use ensured for sustainability*

such purposes. Reclamation of degraded and marginal lands, Common Property Resources (CPRs) and problem soils will receive specific attention. The State will consider establishing State Land Use Planning and Development Board expanding the mandate of existing Land Use Board for addressing all land related issues. Greater emphasis will be laid on scientific land use planning. Special emphasis will be given to adopt conservation agriculture practices in the State. Soil fertility will be improved through site specific integrated nutrient management (INM) practices by balanced use of macro and micro nutrients and use of organic manures [farm yard manure (FYM), compost, vermi-compost/bio-fertilizers/green manure]. The production and quality of bio-fertilizers is much to be desired and priority attention shall be given to strengthen them. Compost pit on every farm and vermi-hatchery in each village will be desirable through proper incentives. Best crop production practices like incorporation of legume crops in rice-wheat system, proper crop rotation, incorporating crop residues in the field instead of burning, tree plantation and raising

fodder resources on village panchayat/common lands and planting of trees on the road sides, canal banks and field bunds will be promoted. Even incentives/suitable compensation to adopt best production practices/practice green agriculture like cash prize, higher MSP, bonus or preferential credit at lower interest rates, etc. will be provided. Management of land resources particularly in dry land/rain fed areas, including Mewat region, using rain water management, watershed approach, conservation agriculture, micro-irrigation practices, arid-horticulture, energy plantation and non-farm livelihood options will receive priority attention.

### 5.1.2 Water

The agriculture policy will lay greater emphasis on producing more grains per drop of water. It will ensure speedy completion of all irrigation projects in the State and give priority to provide canal water in dry land areas. Conjunctive use of surface and ground water to an extent of 20 percent, particularly in brackish water areas, will receive high priority. The days, timings and quantity of water releases to fields in the canal areas shall be determined / streamlined to minimize the hardships of farmers. Since ground water mining has reached alarming level, the Ground Water Draft Bill, 2008 and Haryana Preservation of Sub-Soil water Act, 2009 will be strictly enforced with needed amendments on the basis of feed-back. The major cropping system of the State, namely Rice-Wheat (R-W) system has resulted in overuse of water, fertilizer, mono-cropping and other Natural Resource Management (NRM) related problems. Some acceptable eco-friendly alternatives like taking mung bean in summer need to be explored so that farmers are not at loss. In this context, the State has banned summer paddy cultivation. Banning of summer paddy cultivation in the State has already resulted in saving of about 7 percent water. This ban will continue henceforth with full enforcement. The State shall endeavour to reduce water consumption by at least 30 percent in rice-wheat and cotton-wheat systems. For this, practices like direct seeded rice, alternate furrow irrigation in cotton, plastic mulching, laser land leveling, etc. will be promoted through innovative Government schemes. Lining of water canals and water courses will be given priority attention to save water conveyance losses. Water harvesting practices will be promoted by adopting “*Khet-ka-pani-khet-me*” approach. Laying of underground pipelines and micro-irrigation will be the State priority in future. Steps will be taken to rationalize water tariff for variable uses in different sectors and the discrepancies relating to different sectors of

#### **Improving Water Use Efficiency:**

- *In situ water harvesting (Khet Ka Pani Khet Me)*
- *Discouraging flood irrigation by promoting micro-irrigation*
- *Irrigation management through Water User Associations (WUAs)*
- *Strict Enforcement of Ground Water Draft Bill 2008 and Preservation of Sub-soil Water Act 2009*
- *Speedy completion of irrigation projects*
- *Economic pricing of water*
- *Laser land leveling and water delivery system through pipes*
- *Recharging of aquifer*
- *Management and diversion of flood water*

agriculture (horticulture, livestock, and fishery), shall be addressed. To save water, practice of flood irrigation will be discouraged and incentives for adoption of micro-irrigation practices will be ensured as a matter of high priority, since micro-irrigation will greatly enhance water use efficiency (WUE). Water efficient crops/ varieties will receive priority in future crop breeding programs. The State will also give priority to increasing water resources and renovation of village tanks/ponds/wells. The possibility to include these in MGNREGA activities will be explored. In order to conserve *in situ* farm water, the farmers will also be motivated to raise their farm bunds and dig water ponds (jalkunds) to ensure supplemental irrigation. To maximize the benefits from the currently available water, steps will be taken to organize Water Users Associations (WUAs)/ Panipanchayats throughout the State. In water logged areas, bio-drainage will be promoted. Water pollution is an emerging problem. Through suitable policy initiative, only properly treated industrial effluent and sewage waters having pollutant within tolerance limit shall be allowed for release in canals especially in NCR. Also, the use of chemicals and over exploitation of water will be checked through suitable policy measures. Development of water ponds on waste lands and dry lands, construction of recharge bore wells at appropriate places, pumping of seepage water near canal banks for augmenting water supply and providing water to disadvantaged families will be future priorities. The Government will give maximum attention to spread water literacy throughout the State for not only conservation and sustainable use of water but also for increasing water productivity. Haryana invariably faces excess flood water during the rainy season in Yamuna, Ghaggar and other minor rivers affecting adversely the standing crops, animals and normal life of the people. The State will initiate long term measures in collaboration with neighbouring States to ensure Central Government support for controlling floods by diverting the excess water to water deficit dry land/rain fed areas and by digging bore wells for water recharge. The Government shall also ensure an un-interrupted supply of electricity to the farmers for a minimum of 12 hours. The Transmission and Distribution (T&D) losses of electricity supply in rural areas are currently substantial. Hence, ways and means to reduce these losses will be explored and enforced.

### **5.1.3 Bio-resource Management**

Vast bio-resources like crop residues, sugarcane bagasse, vegetable wastes, fallen leaves from trees, etc. of the State offers unlimited opportunities for energy generation and organic recycling of soils. Currently, crop residue burning is a common practice with farmers. Considering its harmful effects, the State has already banned it. Strict enforcement of this order and promotion of organic recycling practices will be ensured. Since energy is a critical constraint, reasonable pricing of different forms of energy will be ensured. The energy consumption in agriculture needs to be reduced by about 10 percent in the next 5 years through efficient planning and utilization of bio-energy resources.

Alternative sources of energy like using animal power for farm operations like sowing, hoeing, etc, bio-gas, solar, wind and geothermal energy will be explored and new schemes will be put in place. The State will henceforth encourage the use of cow dung as manure and discourage its use as fuel, by taking steps to ensure alternative sources of fuel in rural areas. The State will also encourage rural masses to convert animal wastes in to manure through composting. Non-conventional energy sources like solar dryers, solar cookers, solar water heaters, solar poly-houses, etc. will be popularized. Similarly, solar photovoltaic applications like solar PV-pump based drip system, PV generator for multiple applications, solar PV duster/sprayer, PV winnower-cum-dryers, PV mobile units, etc. will be popularized. In case of wind energy, wind pumps and wind power generators will receive priority attention. Also, the capture and safe use of geothermal energy and nuclear power will be an integral part of non-conventional energy strategy for meeting the future requirements of energy in the State. After sale services shall be strengthened to promote such energy devices in rural areas.

**Bio- resource Management:**

- Ban on crop residue burning
- Un-interrupted supply of electricity
- Reasonable pricing of different forms of energy
- Use of non-conventional sources of energy
- Optimization of cow dung use
- Establishment of organized timber markets
- Protecting valuable agro-biodiversity

The State has already formulated a forestry policy with an ultimate goal to bring 20 percent of geographical area under tree cover in a phased manner so that it can justify its name Haryana, meaning the land of green forests. In order to achieve this target, special efforts towards strengthening agro-forestry will be initiated. It will be a potential source of not only energy and timber but also for top feed. An aggressive approach for planting suitable tree species both in irrigated (such as poplar) and rainfed areas (such as *khejri*) through promotion of agro-forestry shall be taken up to achieve the desired targets, as specified under State Forest Policy, even if it needed some policy amendments. Tree species which have greater capacity for carbon sequestration will be promoted. To address certain problems associated with species suitability and their marketing, the State will enact suitable laws to not to impose restrictions on felling of trees if raised on agricultural land. Also, special efforts to establish organized timber markets in the State will be made in order to facilitate easy trade of agro-forestry products. To promote forestry sector, research and education in agro-forestry will be given priority in the State Agricultural University and opportunities for gainful employment will be provided to trained young personnel.

The State will give due attention to follow the provisions of both Protection of Plant Varieties & Farmers' Rights (PVP&FR) Act (2001) and also the Biological Diversity Act 2002. In this context, the recently constituted State Agriculture Innovation Fund (SAIF) and the State Biodiversity Board will be made fully functional to provide incentives to farmers/farming community for protecting valuable biodiversity keeping in view the

provisions of relevant international conventions. Keeping in view the interest of small holder farmers, the State will frame an appropriate policy on Genetically Modified (GM) crops to harness the benefits of biotechnology ensuring required biosafety measures. Bio-prospecting of valuable germplasm for Intellectual Property Rights (IPR) requirement including Geographical Indicator (GI) (ex. Basmati rice and Murrah buffalo) shall be given priority. Also some botanical gardens shall be established and attention will be given to conserve valuable flora and fauna of the State. Neutralization campaign to make Blue Bulls (both male and female) sterile shall be taken up to address their menace.

#### **5.1.4 Weather and Climate Change**

Weather and climate variability covering mainly rainfall and temperature and occasionally flooding, cyclones, etc. are important determinants of agricultural performance. Their variability has increased during the last 10 years. To reduce the vulnerability of agriculture to increasing weather and climate variability, the Centre is supporting Agro-Meteorological Advisory Service at the district level for weather proofing of farm production by helping farmers to take strategic and tactical management decisions. The Centre has also a National Mission for sustainable agriculture under the National Action Plan on Climate Change. The Mission seeks to transform Indian agriculture into a climate resilient production system through suitable adaptation and mitigation measures in the domains of both crops and animal husbandry. Some of the adaptive strategies include establishing buffer food and fodder stocks, strengthening the irrigation infrastructure, and developing agricultural insurance schemes. The other measures include helping farmers to select short duration less water demanding varieties, replace more water demanding crops with drought tolerant crops, change crop calendar to adjust to the uncertain rainfall, follow conservation agriculture practices, mixed cropping to reduce the risk of crop failure, perennial crops and livestock rearing in rain fed areas, expand non-farm enterprises, etc. The mitigation measures mainly involve strengthening the area of bio-technology and scientific trait assisted breeding to incorporate the desired putative traits under suitable agronomic background in different field crops. In Haryana, puddled rice and livestock (mainly cattle and buffalo) are the main sources of Green House Gases (GHG) emission in agriculture. The State shall attach highest importance to provide site specific weather advisory services to farmers, livestock breeders and fishermen, and suitable measures to minimize adverse consequences of global warming and climate changes.

#### **5.2 Productive Agriculture**

Plateauing yields of major crops is a matter of concern, whereas enhancing agricultural productivity is critical for an accelerated / inclusive growth and development of agriculture in the State. Besides providing food security to the people, agriculture sector provides feeds for animals, raw materials for industry, and employment and livelihood to more than 60% of people in the State. An increase in agricultural productivity will, therefore, remain a major priority under the policy. It is not that only the people engaged in

agriculture get benefitted, but even those employed in other sectors benefit from increased agricultural productivity. We can see that the indices of area have almost remained the same where as that of production and productivity have improved over the last decade.

### 5.2.1 Crop Productivity

A remarkable growth in food grains production has been achieved in Haryana since its creation in 1966-67. Production of food grains has increased from 47.71 lakh tons in 1970-71 to 166.29 lakh tons in 2010-11, showing an increase of more than 300 percent. The wheat and paddy crops have played a major role in pushing up the agricultural production in the State. The average yield per hectare of wheat and paddy during 2010-11 in Haryana had been 46.24 and 27.88 q/ha, respectively. Similarly, the average productivity of total food grains produced in the State during the same period was 35.27 q/ha. The average yield /ha in respect of wheat and paddy at all India level during 2008-09 was 29.07 and 21.30 q/ha, respectively. It is a matter of pride that the State stands first in per hectare average yield of pearl millet as well as rapeseed & mustard. In view of degrading natural resources (soil, water), the State has already banned cultivation of summer rice. Other options to replace paddy like promoting maize cultivation both in *kharif* and spring shall be explored. Also direct seeded rice/aerobic basmati rice shall

be encouraged. It will also be necessary to demarcate areas under rice and wheat (in terms of hybrid, basmati, organic, etc.) so as to sustain long term use of natural resources.

In spite of these significant achievements over the years, there still exists considerable gap in the experimental yield and that obtained at the farmers' fields. All out efforts are hence required to bridge the existing gaps. To achieve this, special emphasis will be on covering more area under hybrids. Special efforts for timely planting like wheat in

second half of October- first half of November, autumn planting of sugarcane, while promoting intercropping, nursery planting of rice only in mid-June and direct seeded basmati rice will be taken up in a Mission Mode. Late planting of wheat after mid-January shall be discouraged and raise bed planting of wheat and spring maize as well as conservation agriculture practices are to be promoted to increase productivity of crops. Raising of summer mung-bean in rice wheat system and growing of wheat in standing cotton in October-November are other promising options. In addition, to have new innovations, cutting-edge science in research institutions will be redirected towards meeting the felt and prioritized needs of the farming communities. More emphasis will be given for increased resistance/ tolerant to biotic and abiotic stresses. New opportunities

#### Meeting Crop Productivity Challenges:

- *Narrowing existing yield gaps*
- *Breeding high yielding stress tolerant hybrids/ varieties/ species*
- *Production of enough good quality seeds*
- *Increased investment in research for development*
- *Promoting crop diversification*

will also be explored for crop diversification and best package of practices so as to ensure both increased productivity and income of farmers.

### 5.2.2 Productivity of Horticultural Crops

Fruits, vegetables, flowers and mushrooms, including several types of medicinal mushrooms are important horticultural crops grown in Haryana which are in great demand nationally and internationally. Presently horticulture accounts for 6.4% of the total crop area in the State. Every effort is being made to achieve the target of 10%. The State has small acreage under spices, medicinal & aromatic plants also. The total area under fruits was 7.86 thousand hectare with a total production of 27.53 thousand tons and productivity of 3.5 tons per hectare during 1966-67, which had increased to 46.25 thousand hectare with a total production of 356.6 thousand tons and average productivity of 13.04 tons by the end of 2010-11. The total area under vegetables was 11.30 thousand hectare with a total production of 1,35.36 thousand tons and average productivity of 11.97 tons during 1966-67, which has increased to 465 thousand hectare with a total production of 4649.28 thousand tons with average productivity of 13.42 tons by the end of 2010-11. There was no flower cultivation in the State during 1966-67 but covered 6.3 thousand ha during 2010-11. Similarly, mushroom cultivation picked up during 1989-90 and by the end of 2010-11, production went up to the extent of 8 thousand tons with average productivity of 6.07 kilogram per tray and Haryana is now a leading mushroom producing State in the country. On the contrary, Haryana is a non-mushroom consuming State. Therefore exports of mushroom along with other types of medicinal mushrooms should be the future

#### **Meeting the Productivity Challenges:**

- Increased acreage under hybrids
- Large scale adoption of protected cultivation
- Development of functional foods and nutraceuticals using F&Vs and indigenous flora
- Promoting arid horticulture
- Emphasis on mushroom production and honey bee as pollinators

strategy. Cultivation of aromatic plants is also increasing due to higher returns. Changes in productivity of important horticultural crops over years are the reflections of good achievements so far. Under Horticulture Mission, efforts will be made to increase it further. Every effort will be made, using cutting edge technology to make horticulture a lucrative proposition for the farmers in Haryana. More emphasis will be placed on increased acreage under hybrids and adoption of protected cultivation in larger areas with soft loan facility. Research and development efforts will be reoriented to meet the need and expectations of farmers. Production of quality seeds and planting materials will receive high priority. Emphasis will be laid on developing management practices, use of plasticulture, fertigation and mulching for intensive commercial production of horticultural crops. New opportunities will be explored on arid horticulture technology including agro forestry systems particularly in Zone III and develop functional foods and nutraceuticals using fruits & vegetables and indigenous flora. Perennial fruits for agro horticulture and tree

species for agro forestry, using micro irrigation, shall be promoted including raising of bees as pollinators for ensuring higher production of many crops. Hinter land orchards shall be protected from acquisition of land for residential/ commercial activities.

### 5.2.3 Livestock Productivity

Production of milk, eggs, wool and meat in the State has increased from 18 lakh tons, 1567 lakh, 8.14 lakh kg and 28.79 lakh kg in 1978-79 to 62.67 lakh tons, 39641 lakh, 12.87 lakh kg and 125.27 lakh kg in 2010-11, respectively. Special emphasis will be given to produce large numbers of progeny tested (proven) elite bulls of Murrah Buffalo and Haryana & Sahiwal breeds of cattle for genetic improvement. To start breeding program in a more scientific way, emphasis will be laid on sex-sorting of Murrah semen in the State. Also the modern technology of embryo transfer will be introduced. Use of sexed semen of elite bulls will be encouraged for further genetic enhancement. Basic diagnostic services are lacking in villages and hence 'Lab on Wheel' facility shall be introduced. Like the seed village concept, Murrah village for semen production and genetic improvement has to be promoted. In order to provide balanced feed and fodder to cross bred and high yielding animals for better exploitation of their milk potential, fodder seed production program will be taken up on large scale as a matter of priority. *Berseem* production shall be given a big boost. Efforts will be made to ensure remunerative prices for milk and other livestock products. The policy shall ensure establishment of a "Livestock Mission" in the State along with adequate financial support to address issues relating to cross breeding in cattle, management of male buffalo calf and spent animals, banning of scrub bulls, migration of high yielding buffaloes from

#### Livestock Productivity Challenges:

- *Integrated approach for animal management focusing on breeding, nutrition and health*
- *Health care and management centres for livestock, small ruminants, poultry and fish*
- *Use of progeny tested elite bulls*
- *Emphasis on quality fodder seed production*
- *Use of sexed semen in Murrah buffalo and Sahiwal cows*
- *Harnessing embryo transfer technology*
- *Establishment of Livestock Mission*

the State, insurance cover for all milch animals, following, strict quarantine procedures, incentives for deworming, mineral mixture production and supply, production and sale of hygienic milk, value addition, entrepreneurship development, cold chain for storage and transportation of milk, promotion of milking machines, and construction of model community cattle shed/housing, increasing the number of veterinary technicians, IPR on Murrah buffalo (GI and sui-generis), promoting cooperatives and SHGs to promote organized dairying, formation of breeders association etc. The animal hostel model propagated in Gujarat State, making the village clean, self-sufficient in dung, biogas, and electricity needs, shall be tried and tested. Efforts will be directed for compulsory identification and vaccination of animals. In view of importance of fodder for livestock production, the responsibility of fodder seed production shall be clearly delineated between

Animal Husbandry Department and Agriculture Department. Five yearly rolling plans for fodder seed production of improved high yielding varieties/ hybrids will be prepared and implemented. The contribution of milk from buffalo and cow, which is presently 83% and 17%, will be redesigned to ensure 70% and 30%, respectively, in view of the increasing demand of low fat milk in health conscious urban society. The coverage of AI in buffaloes and cows will be raised from the present around 50% to 90%, in next 5-7 years. Efficient veterinary services will be ensured by providing competent and trained veterinarian/paravet for every three thousand cattle units. A growth rate of 6-8% will be ensured in long term from the livestock sector in Haryana.

#### 5.2.4 Fish Productivity

The annual fish production in the State, which was 600 tons during the year 1966, has increased to 94 thousand tons in 2010-11. The fish productivity per ha per year has also increased to 5,500 kg in 2010-11 from 4,576 kg. Growth rate in fish production was 11.8% during the 11<sup>th</sup> Five Year Plan need to be further accelerated through proper policy and technology support. Currently, the Government has set up 20 Fish Health Care Centres, 14 Aquatic Polyclinics and one State level Diagnostic Laboratory. These facilities need to be strengthened in order to provide required seed, health care, feed services, research and human resource support to fish farmers. To ensure these, required policy and legal instruments shall be put in place. Water and electricity charges shall be rationalized at par with crop production. Policy on lease shall be revisited to ensure contract for longer period. Fish biodiversity conservation will also be addressed suitably. A College of Fisheries will be established at some suitable location to address human resource requirement. Diversification in fish species as well as area, including brackish water resources and infertile waste lands, will be promoted through proper R&D backup. Rural based low cost post harvest processing and value addition for diversified fish products will be ensured so as to enhance income of fish farmers in the State.

##### **Increasing Fish Productivity:**

- *Fish diversification for enhanced productivity*
- *Strengthening fish processing, value addition and marketing facilities*
- *Emphasis on quality seed and feed along with processing standards*
- *Developing required institutions and competent human resource at different levels*

#### 5.3 Secondary Agriculture

Having been in the lead in primary agriculture (grains, sugarcane, *guar*, cotton, fruits, vegetables and milk), it is opportune time now that Haryana should capitalize on its niche strengths by improving the level of secondary agriculture (adding value to primary produce).

### 5.3.1 Niche Areas

To promote secondary agriculture, the State shall follow commodity/enterprise value chain approach for aggressively taking up mozzarella cheese using buffalo milk, basmati rice, *guar* production, mushroom production, agro-tourism etc. The details about strengths of dairying, basmati rice, poultry and fishery are already provided earlier under Section 3. *Guar* is an important commercial crop and about 80 percent of the world demand for *guar* gum is met from India. Production of *guar* gum in Haryana is about 1 lakh tons accounting for 11 percent of national production. The average area sown under *guar* seed and production in Haryana State, for the triennium ending, 2010-11 was 2.92 lakh ha and 4.27 lakh tons, respectively. About 75 percent of the *guar* produced in the State is exported in the form of *guar* gum and its derivatives. Since Haryana has not developed adequate modern *guar* processing facilities, it is sent to the neighbouring State of Rajasthan for processing. Another attraction for sending *guar* to Rajasthan for processing of *guar* seeds is lower level of VAT in that State. The State shall give priority to establish modern processing and quality testing facilities at suitable locations within the State and encourage its proper marketing and export. The State shall also rationalize its tax structure in relation to its neighbouring States and make it competitive. Also incentives shall be provided to private sector for production of *guar* gum derivatives for value addition in *guar* and export for ensuring increased income.

The State has emerged as a leading producer of quality button mushroom in the country. This strength shall be further exploited through diversification, increased production, processing, value addition and marketing/ export of high value mushrooms and other fungi species which have medicinal value.

These enterprises are low hanging fruits of immense potential, have natural business advantage in Haryana and the State shall consider exploitation of the gold mines of these commodities.

The State shall double its investment in next 5 years on establishment of cold chains/value chains/supply chains in milk, meat, poultry, fishery, *guar*, basmati rice and mushroom production. To promote value chains, the State shall create special agri-business zones offering agro-biological and socio-economic advantage with inbuilt incentives in production, assembling/aggregation, grading and standardization, processing, marketing, retailing, pricing, market intelligence, credit and risk insurance, technical backstopping,

#### Optimizing Available Opportunities:

- Capitalizing on Basmati rice and Murrah buffalo
- Emphasis on diversification, higher productivity and value addition in Mushrooms
- Exploitation of Guar production and value addition
- Agro tourism/ farm tourism
- State-of-the art infrastructure and policy for PPP
- Training for entrepreneurship development
- Rationalization of tax structure
- Quality control and marketing

packaging, branding, labeling and export. Strengthening Research & Development (R&D) shall be pursued through establishing technology incubation centres in agricultural universities, technology parks/food parks/ multi-commodity, multi-product complexes in producing areas and extensive entrepreneurship training and development activities. Emphasis shall be laid to build State-of-the art infrastructure in PPP mode with regard to roads (all weather roads, pucca farm roads), air conditioned transport, cold storage, warehousing facilities in different markets and provision of cheap loan and cash advances up to 70 percent of the total value of the produce stored, grading and standardization, testing facilities for food quality and safety and comprehensive animal health cover to increase fertility and productivity. To benefit maximum from trade, the State shall formulate its own Export Import (EXIM) policy in tandem with national policy under World Trade Organization (WTO) regime. The State shall also establish an Apex Trading Centre for export promotion at a strategic location near the International Airport for niche products like *guar* gum, Mozzarella cheese, organic basmati rice, wheat and wheat products, mushrooms including medicinal mushroom, Murrah breed etc. The State shall promote/support organization of producer companies/co-operatives/SHG and contract farming with effective buy-back arrangements, legal support, etc. There shall be suitable reforms in marketing, particularly amending Agricultural Produce Markets Act to relax restrictions on market jurisdiction with respect to fruits and vegetables, restrictions on the movement of agricultural produce within and outside the State, implementation of Contract Farming Rules (2007) with suitable modifications, etc. Road side markets are emerging as an attractive opportunity for small producers to sell their perishable products like fruits and vegetables at profitable rates. As such, small sale points will be developed along the road sides at appropriate places for the primary producers exempt from any levy to sell their produce.

Demand for organically produced agricultural commodities is increasing at faster pace with increased income and health consciousness. Also, organic farming is very much helpful in protecting natural resources in addition to ensuring higher profit to the farmers. The State being in close proximity to national capital having ever ready market, every effort will be made to facilitate farmers in producing organic products. Suitable compensation shall be ensured to the organic farmers in the initial stage. The State shall make elaborate arrangements for establishing needed facilities for certification of organic produce/products.

Yet another related niche area for Haryana is uncommon opportunities from pursuing agro/farm tourism as farm income augmenting activity as many of the districts are strategically located nearer to National Capital Region (NCR). Also, Haryana has a good network of well managed 28 Motels on highways/main roads passing through important cities/towns in the State. They shall be upgraded as agro-tourism hubs connected to well define rural hinterland for promotion of travel and stay, trade, rural arts and crafts, unique ethnic foods, culture and tradition. The State has several places of tourist attraction like

Surajkund, Badkhal Lake, Pinjore, Kurukshetra, Yamunanagar, etc. The income from tourism in Haryana during the year 2006-07 was 172 crore which has increased to Rs. 265.32 crore in 2010-11.

The Department of Tourism in the State, in partnership with 21 farm owners in Haryana is already offering special country holiday packages in these farms in country side nearer to NCR. This initiative has already become very popular and the demand is increasing steadily. This initiative shall be pursued vigorously. The popularity of Surajkund Mela and excursions to Badkhal Lake are other examples of unlimited potential from agro-tourism in the State. The Department of Tourism shall make every effort to make these initiatives a people's movement with community participation.

#### **5.4 Innovative Agriculture**

Innovations hold key to future success in farming. If Haryana State has to excel and remain at the top in agriculture sector, it has to do business differently, more creatively and with a futuristic vision and passion. It has to increase investments, and prioritize programs and activities. Though the whole approach to business should continue to be science/technology/innovation centric, but the importance of creating an enabling environment consisting of restructured and revamped input, service and supply/delivery system, credit and insurance system, marketing and pricing system and health and education system is no less important. There should be both quantitative and qualitative improvements in the structure, organization and functioning of each one of these systems/services to make a difference. For this, functional & financial empowerment of Agricultural Universities will receive high priority. This strategy should directly address goal one which is more basic but complex than the other two goals. The pathway of how increased food production translates to better nutrition, increased income and employment and finally inclusiveness and livelihood security is still empirically not much known though importance of improved health, education, gender and policies are discussed and considered as crucial enablers. Suitable policies are to be framed to translate the strategy into output and outcome. Protective cultivation and solid waste management especially in peri-urban agriculture areas will be given priority. Vegetable soybean, sweet corn and baby corn will be popularized in peri-urban areas. The State shall explore opportunities for income generation and soil improvement in specialized production of *berseem* and its seeds which are in short supply and fetch high prices.

##### **5.4.1 Dairy based Integrated Farming System**

Since Haryana has the natural economic advantage of promoting dairy, the policy shall focus on dairy based farming system. The State shall consider incentives and support to organized dairying at three levels; namely, small, medium and large scale. Dairying by small holders will largely depend on crop residues and the by-products as feed, with labour input of family members. Since, about 70% of expenditure in dairying is on the feeding of animals, development/enrichment of feed and fodder resources will receive priority

attention. The State shall follow a breeding policy with focus on extensive AI service covering all breeding stock with certified proven semen. Natural service to the extent feasible will be provided through certified bulls only. In order to make best use of unproductive animals, alternate uses including leather, vermi-compost, bio fertilizer and pesticides from dung, urine and other animal wastes/products shall be promoted. Provision of free kits consisting of mineral mixture and de-worming medicines for each calf up to the age of 6 months will be made. Priority will be given for creation of special Cell in the State Animal Husbandry Department for fodder production. Networking of Gausalas will be undertaken for conservation of indigenous cattle breeds of Haryana, Sahiwal, and Tharparkar etc. Use of ICT tools including mobile phones will be encouraged for providing health cover under PPP mode. Specialized extension services will be ensured by recruiting manpower with Veterinary/Dairy/Animal Husbandry extension background. A network of residue testing labs for antibiotics, drugs, and toxicants in animal/fish products shall be established. Diploma and vocational certificate courses in feeding, breeding and health management shall be taken up on priority for training dairy technicians and farmers. Self-help groups, cooperatives, breeders associations, and producers companies shall be promoted for value addition and forward/backward linkages. The dairy based farming system shall be pursued under the State “Livestock Mission” proposed. Value addition of milk and dairy products including Mozzarella cheese, designer health products/beverages using a mix of dairy, fruits, millets etc. will be promoted for higher income to farmers and for general health benefits. Hygienic and organic milk production will be encouraged with proper R&D backup as well as policy support. Water and electricity charges, credit facility and taxation will be made on par with crop production.

**Farming System Approach:**

- Promoting dairy based farming system
- Use of certified bulls
- Balanced diet to animals
- Ensuring health care under PPP mode
- Establishment of fodder banks
- Net- working of Gausalas
- Priority for training dairy technicians and paravets

#### **5.4.2 Delivery System**

One of the often reported reasons for poor performance in agriculture in recent years is inadequate and inefficient delivery system. Therefore, more attention shall be given to toning up delivery system for ensuring supply of all inputs in required quantity of specified quality at affordable prices nearer to the door steps of the farmers. Since seed is the most critical input in farming, availability of sufficient quantity of HYV and hybrid seeds shall be ensured, with greater thrust on availability of sufficient quantity of hybrid seed. Similarly, establishment of nursery and production of vegetable seed shall be given high priority. Establishing fodder seed production farms and implementing seed village scheme on large scale shall be pursued under rolling plan. Since, seed treatment is basic requirement for good crop establishment, seed treatment/priming shall receive priority attention. Since seeds of hybrids (like Bt. Cotton) are rather costly, a regulatory/competitive mechanism shall be established for and oversight function. Seed certification procedures

shall be simplified. In view of rising complaints about supply of spurious inputs and ensuring supply of produce of prescribed quality and standard to the farmers/market/consumers, testing and certification facilities for inputs and produce including organically grown shall be established/strengthened nearer to producing areas at a distance of not more than 10 Km from the village. From time to time, the State has formulated several policies, rules and procedures to promote agriculture and allied sectors in the State. However, it is often complained that strict enforcement of these has not taken place to fully benefit from them. Special attention shall be given to strict enforcement of all laws/rules with appropriate incentives. Service sector has considerably grown in the economy but not in agricultural sector. With increasing commercialization and market dependence of agriculture, the demand for several agricultural and related services in villages at the door steps of farmers has increased. Catering to these services will also be beneficial to create rural employment and enhance rural earnings. To develop a supportive and competent service system, agric-service/custom hiring centres run by agric-graduates /trained farm youth and women shall be promoted with needed incentives, financing, training and licensing. Blue bull menace has become a wide spread, common problem in rural areas. Besides suitable amendments in the Forest Act and Animal Welfare Act, possible sterilization of both male and female herds, financial support to farmers to erect fencing/electric fencing to protect orchards and some of the crops from blue bulls shall be made to overcome the problem. To promote organic agriculture, subsidies to farmers to buy organic inputs and follow recommended practices shall be provided besides establishing facilities for organic certification at suitable nearby places. To encourage performer's in agriculture and allied sectors and to build needed human resource, incentives and awards shall be given. Similarly, to motivate youth remain in farming, agriculture will be taught as a subject both in primary and secondary schools. To overcome acute labour scarcity, emphasis shall be laid on mechanization of farm operations, such as: harvesting and cleaning in sugarcane, mechanized weed control in rainfed crops, paddy trans-planter, multi-crop planters, farm women specific tools and implements. Required subsidy shall be provided for machinery and equipments, such as: reapers, zero till drills, laser levelers, etc. Quarantine and testing facilities for examining imported seeds, planting materials, semen

#### **Efficient Delivery System:**

- *Timely supply of quality inputs in desired quantity at farmers' door steps*
- *Introduction of seed village scheme and rolling plan*
- *Certification of inputs/ produce for quality*
- *Emphasis on strict enforcement of all laws/rules/regulations*
- *Agribusiness services through agriculture graduates/trained farm youths*
- *Incentives and awards to encourage performers*
- *Farm mechanization for timely operations*
- *24 x7 dedicated TV channel on Agriculture*
- *Quarantine testing of imported materials*
- *Training of farmers, women and youth*
- *Emphasis on rural non-farm enterprises*

and vaccines shall be established and strictly enforced. Input organizations will be provided with equity capital, bank loans, and better HR practices.

To reinvigorate current extension system, computerization and public access to knowledge through ICT shall be accelerated. There shall also be a 24x7 T.V. Channel in agriculture. CDs on best agricultural practices shall be prepared and widely distributed. Farmer Field Schools shall be established to promote farmer to farmer learning. Since lack of awareness concerning innovation and best agriculture practices is often stated as main reason for poor adoption and impact, maximum attention shall be given to the training of farmers and youth as *Krishi Pracharak*, women, traders, retailers (especially input dealers), development workers, members of self-help groups, co-operatives and producer companies. Documentation, testing and use of proven traditional wisdom shall also be ensured. Looking to the pace of dietary changes taking place, it is often stated that the next revolution in agriculture shall be through agro-processing/post-harvest management. Priority attention shall be given to promote it with emphasis on diversification and needed investment, infrastructure, R&D support, extension, entrepreneurship training, incentives, financing, marketing and policies. Since income from non-farm enterprises has become significant in rural areas (as much as 50 percent in many cases), promoting such enterprises, shall receive more attention. As many districts of Haryana are adjoining to NCR; development of peri-urban agriculture shall get high priority and support. Protected cultivation will be promoted through suitable incentives. Farmers led innovations will be recognized and out scaled.

### 5.4.3 Credit System

Credit is the life line of any production system. Adequate and timely supply of credit with easy terms and conditions to farmers, including tenant's cultivators/women farmers, shall be ensured in order to enhance production by masses. To avoid distress sale and to help small and marginal farmers, credit shall be given at low rate of interest. Also in order to help farmers to get more than one loan on a given property, the mortgage of land by the Banks will be regulated as per the value of the land and amount of loan requested. The stamp duty on issuing KCCs will be waived off and procedures of issuing credit cards will be further simplified. The time taken to issue KCCs will be reduced to less than 6 months.

For sustaining productivity on a long term basis, land development activities become important. Since farmers invariably have less/no savings and avails production credit, both medium and long term credit supply is affected adversely with practically no infrastructure and land development activities. Hence, innovative scheme shall be put in place to provide medium and long term credit.

#### **Ensuring Credit Supply:**

- *KCCs to all farmers within a specified period*
- *Adequate and timely supply of credit at lower interest rates*
- *Provision for short term credit against produce*
- *Credit to every farmer, including tenants*
- *Provision for consumption credit*

Yet another missing dimension in agricultural lending is absence of consumption loan. Since consumption is an essential part of life, particularly for BPL families, unless this need is addressed, there will always be a tendency to divert loans. Therefore, steps shall be taken to consider this aspect in the overall credit system. The institution of money lenders has served well so far and has some clear advantages. To take advantage of their lending system, suitable reforms and institutional mechanism, such as credit delivery through banks shall be encouraged.

#### 5.4.4 Managing Risk and Uncertainty

Risks and uncertainties are invariably many in the farming operations and rather increasing owing to climate change. Nothing can be worse for a farmer than a natural disaster. The early information/warning system with respect to weather, natural calamities, floods/droughts, shortage of critical inputs shall be ensured and strengthened. To protect the farmers, the natural calamities shall be assessed at the Block level rather than at District level as at present. Further, in case of damage of crops/enterprises by natural calamities, suitable interim financial relief shall be made available immediately to the farmers till such time final assessment is done by the State/ Central Government agencies. The mechanisms of compensation and loan defrayment are not only archaic but irrelevant, slow and insensitive to existing conditions. Steps will be taken for systematic rescheduling of loans according to nature and extent of natural calamities matching to the justified need of farmers.

##### *Reforms in Safety Net Programs:*

- *To overcome constraints in national crop insurance scheme*
- *Sowing risk to be covered*
- *No late indemnity payment*
- *Frost, cyclones, terminal heat stress at flowering to be covered*
- *Amelioration of price risks*

Frost, cyclones, floods, terminal heat stress at flowering in wheat and other crops are also important components of risk and will be suitably accounted for. To manage risks, a comprehensive agricultural insurance scheme to cover all major crops and livestock including fisheries shall be put in place. All the drawbacks of the existing livestock insurance scheme like restricting it to only two animals per farmer and only on death due to flood/drought but not from specific diseases, not covering permanent production and reproduction losses, younger animals or animal species other than cattle and buffaloes like fisheries shall be addressed. The State shall establish a price stabilization fund with suitable contributions from farmers during favourable years. As a progressive measure, the State shall pilot a health insurance scheme for the farmers having KCC and assess its utility, cost and other implications.

Day to day wide fluctuation in the prices of agricultural commodities is a common phenomenon particularly in post-harvest prices. To protect the farmers' from such uncertainties, existing warehousing facilities in the present markets will be strengthened and more warehouses will be constructed in rural areas to protect the farmers from distress sale. Provision of up-to-date market intelligence covering all important national and

international markets to the farmers and to one and all involved in the value chain will receive top priority.

#### 5.4.5 Processing and Value Addition

The number of small scale agro-processing industries in the State is not enough to process the available surpluses. Moreover, these processing units, in general, are located in urban areas away from the production centres. Emphasis shall be given to rural based primary processing and value addition and small scale agro-processing centres will be established. Priority shall be given to the development of multi-commodity/multi-product agro-processing complexes/food parks rather than individual commodity /products to optimally utilize infrastructure and reduce cost of processing. Also primary producers shall be motivated to establish producers companies for processing and value addition. Needed support shall be extended by the government in facilitating the process for their marketing.

#### 5.4.6 Marketing

Marketing is the key to success in farming. It is the market where the output price decision takes place and the fate of the farmer is decided. Lack of proper marketing infrastructure, practices, pricing, information and regulations like Agricultural Produce Markets Act are the factors responsible for poor returns and economic harassment to the farmers, especially so in case of perishable commodities. Marketing system should, therefore, be more strong and efficient to serve the interest of farmers and consumers.

The State shall amend the APMC Act, allowing establishment of private and cooperative markets as well as permission to farmers for direct sale. Specialized modern *mandies* shall be established for fruits, vegetables, flowers, milk and milk products, fishery and poultry products with cold chain, primary processing and packaging facilities supported by IT driven market intelligence. The State will properly regulate the supply of perishable commodities by fixing MSP for major fruits and vegetables, milk, egg, and fish. The MSP should be at least 150 percent of

##### Reforms in the Marketing System:

- Terminal markets with all modern facilities linked with international market
- Direct sale by farmers to the consumers through kisan bazars
- Specialized markets for perishable commodities
- Quality control and pledged storage facilities
- Progressive EXIM policy for the State
- Establishment of multi-commodity agro-processing complexes
- Suitable policies to promote sale of processed products
- Amendments in APMC Act to be carried out

the cost of production estimated on Bureau of Industrial Costs and Prices (BICP) basis to ensure remunerative price to the farmers. Terminal markets with State-of-art facilities and linking them with international markets shall receive attention. To avoid distress sale by the farmers, produce assembly centres with grading and pledged storage facilities at nominal charges in and around a cluster of villages shall be the State priority. Food quality testing Labs shall be established. Extensive training in food quality and grading shall be imparted. The State shall attempt to professionalize the management of all the co-operatives for better

business performance. Farmer organizations like co-operatives, producer companies, SHGs shall be organized for marketing and trading of inputs and agriculture produce. To facilitate marketing directly by farmers, *Kisan Bazars* on pattern of *Raitu Bazars* (Andhra Pradesh), *Apni Mandi* (Punjab) and *Shetkari Bazar* (Maharashtra) shall be promoted by providing suitable financial and other logistic support such as: grading, storage, free transport in State Transport Buses, stay facilities, etc. Development of roadside markets especially along with the highways at appropriate distance/ places shall receive priority attention. The State shall encourage contract farming with needed changes in rules and regulations. The State shall also frame a progressive EXIM policy keeping in view long term interest of State and farmers. The State shall establish community food grain banks to market underutilized grains and fodder banks in villages/ cluster of villages. To strengthen the marketing system, the State shall establish market intelligence centres using information and communication technology (ICT) at suitable locations in order to provide up-to-date analysis and advice on regular basis.

#### **5.4.7 Agricultural Research & Development**

Agricultural research is the key to increase productivity and profitability of farmers. The funding support for agricultural research is thus critical and shall be increased substantially (3 times). Beside State allocations, a Special Fund for AR4D using a certain proportion of funds of Marketing Board and Sugarcane Department shall be created. Also availability of qualified human resource in adequate number has emerged as a major limitation lately in running the research institutions. Therefore, all vacant posts in the State Agricultural Universities shall be allowed to be filled at the earliest. Also rules and procedures shall be simplified and greater autonomy shall be accorded. Relevant and demand driven research shall receive priority for implementation in a time targeted manner. The research programs will be reoriented and made more 'Farmer Centric' with major focus on integrated farming system's approach taking into account different farm sizes/ farming situations in each of the agro-climatic zones. Development of package of practices for organic farming, low volume high value crops including medicinal plants, shall also receive desired attention. Major emphasis will be laid to out scale innovations for greater impact on small holder farmers. Technologies that save input use and help in value addition shall be promoted for increased income of resource poor farmers. There will be concerted efforts for convergence of activities and use of resources of KVK, ATMA, RKVY and other development oriented programs of both Center and the State.

#### 5.4.8 Investment and Governance

Worldwide there is an under-investment on agriculture/agricultural research and Haryana is not an exception. Investment in agriculture and agricultural research has to be in alignment with its contribution to State GDP. The present investment in agricultural research in Haryana shall be increased by 3 times in the next 10 years. There are many development schemes in the State with more or less similar objectives. A conducive environment shall be created through a favourable price and trade regime to promote farmers' own investments as also investments by private sector. To optimize scarce resources, convergence of all the development schemes and coordination among different Departments/Ministries in the State shall be given priority. No program/project shall be approved unless convergence exercise across the schemes is completed. To ensure impact and accountability in spending public money under each scheme to contribute to targeted output/outcome/societal gains, monitoring and evaluation of schemes shall be made mandatory and the non performing schemes shall be phased out. To avoid inconvenience and harassment to farmers, computerization of land records shall be given priority and a single "Agricultural Passbook" shall be provided to farmers containing details of family, land holding, soil health, livestock, farm machinery, etc. which will help the farmer in seeking solutions on different issues of farming, subsidy, credit, marketing, insurance, etc.

##### Increased Investment and Good Governance:

- Budget for agriculture research for development to be tripled and linked with its contribution to State GDP
- Creation of favourable environment for farmers investment
- Convergence of all development schemes at district levels having similar objectives operated by different departments
- No project/ program to be approved without convergence exercise
- Monitoring and evaluation of schemes to become top priority
- A single Agricultural Passbook to the farmers with information on farm and family related matters

#### 5.4.9 Empowerment of Women

Women constitute nearly 50 percent of working agriculture population of the State and their contribution to agriculture is even higher. But they invariably do not get due importance in decision making, planning/ managing/sharing earnings and even property ownership. Therefore, the State shall promote policies to empower farm women through conferment of land rights such as: issue of joint *pattas* for both homestead and agricultural land, and access to credit and other services/assistance. Engendering of women through training, education and recognition of their traditional arts and crafts shall receive top priority.

#### 5.4.10 Rural Non-Farm Income

The share of farm income from rural non-farm enterprises is around 50 percent particularly in dry land situations and this share is increasing. In general, the rural non-farm enterprises include labour, petty trade (*kirana* shops), knitting and tailoring, beekeeping, vermi-composting, rural arts and crafts, manufacture of handloom products, silkworm rearing,

etc. Since these are mostly non-land based activities, the Government shall give priority to strengthen and support these activities through technical backstopping, training, incentives, financial assistance, marketing support, quality assurance, etc. Rural artisans shall be given financial assistance to stay and improve their skills to contribute as important rural service providers.

## **6. Road Map for Implementation**

Importance of any policy lies in its effective and timely implementation. Hence, the State intends to implement this policy aiming at continued 4% growth in agriculture. The following Stated strategic goals shall be speedily attained through a well drawn implementation plan (Road Map).

### **Strategic Goals**

The basic principles involved in the planning and operation would ensure: farming systems' approach in eco-regional perspective, use of advances in science & Technology (S&T), focus on applied and demand driven research with emphasis on small holder farmers, diversification both horizontal as well as vertical, harnessing niche strengths, selective mechanization, value addition, supportive policies, reliable and sufficient supply, service and delivery system, aggressive training and skills up-gradation, engagement of women and youth and their empowerment, efficiency in the use of all inputs, public-private partnership and timely monitoring and evaluation. The following are some of the suggested specific action points. It is important to note that while implementing the policy, the suggested goals including the new ones that become important from time to time shall be kept in view.

The overarching principles in implementing this policy will centre around:

1. To have a time bound action plan involving all stakeholders and converging all related institutions, programs, services, supplies and support systems at the district level and below, defining clear cut targets, provide/mobilize needed resources as required, and to monitor, evaluate and assess the progress for taking mid-course corrections to achieve the targets.
2. To ensure timely supply of adequate quantity and quality of seed, saplings, planting materials, feed, fodder, semen, medicines, vaccines, fertilizers, plant protection facilities, water, power, credit, technical knowledge and market intelligence.
3. To ensure most efficient use of land, water and other natural resources, with emphasis on per day/ per unit productivity rather than overall productivity.
4. To strengthen SAUs to provide State of the art S&T and human resource back-up and continuously upgrade the skills of development workers in modern advisory services and best agricultural practices in order to attain an accelerated, sustainable and equitable development of agriculture in the State.

## 6.1 Bridging the Productivity Gap

Agricultural productivity in the State can be increased considerably by bridging the yield gaps between genetic potential, attainable under frontline demonstrations and that attained at farmer's fields. In the major cereal crops, the vertical gaps vary from 14 % to 60%. The major yield gaps are due to lack of proper management practices. These shall be narrowed down by undertaking appropriate interventions and evolving strategic Road Map as we move forward to implement this agriculture policy. In this context, some action points are proposed as under:

### Action Points

- To follow scientific land use planning taking into account competing uses, climate change, cropping system, soil health, water availability, declining TFP, etc.
- Encourage public-private partnership in hybrid/quality seed production and formation of seed villages with proper technical knowhow/backup.
- Production, testing and distribution/sale of improved seeds, tools, small farm implements and machinery, by involving private sector for greater participation through creation of enabling environment.
- Support for viable units of integrated farming systems (IFS), with emphasis on greater diversification. Also to promote inter-cropping/ multiple cropping to harness spatial and temporal advantages of different crops and to encourage organic agriculture in selected areas to reduce and stabilize cost of cultivation.
- Establish testing/certification services/centres for critical inputs and niche products in PPP mode, cooperative sector, NGOs and local colleges, knowledge and communication centres at each district headquarter.
- Promoting lab to land and land to lab activities at quick pace and Organize farmer field schools (with emphasis on women farmers) and impart training on various aspects of IFS, value addition, in the use of best production practices involving champion farmers. Organize exposure visits of farmers and development workers for cross learning to the sites of success stories.
- Ensure better custom hire services through network of technology agents in different specialized areas.
- Balanced use of plant nutrients on the basis of soil test analysis. For this, free soil health cards to all the farmers will be provided on priority.

## 6.2 Thrust on Livestock Development

Current growth of livestock sector can further be accelerated through progressive policies and balanced emphasis on buffalo, cattle, poultry, fish and dairy sector. Beside thrust on genetic improvement of local breeds like Murrah, Hariana and Sahiwal, greater benefits can be harnessed by production of A2 milk, unique in these breeds, by value addition of milk products and by production of Mozzarella cheese from Murrah buffalo milk. Emphasis on

good management and improved feed and fodder resources could also help in faster growth of live stock sector.

### 6.2.1 Action Points for Livestock

- Only progeny tested breeding bulls and certified semen be used for breeding of field animals and the herds belonging to Goshalas in a networking mode.
- Modern biotechnological tools like embryo transfer and marker assisted selection to be employed in superior elite animals of Murrah buffalo and Sahiwal cow for faster multiplication.
- Further incentives to Murrah buffalo breeders for conservation and genetic improvement of breed giving more than 20 litres of milk.
- Notification of separate dairy, sheep and goat zones. Mewat region, due to its socio-economic profile, offers excellent platform for meat production. Hence, possibilities be explored for good quality meat production using goat, sheep and buffalo males by creating modern abattoirs and associated necessary infrastructure. Rest of the State be designated as dairy zone.
- Veterinary services including diagnostic facilities need to be made mobile for effective door step delivery. Each district should have at least one polyclinic. Also disease investigation and forecasting system has to be strengthened.
- The success story of FMD vaccination program be extended to cover other diseases like Brucellosis, HS and PPR, etc. to minimize considerable economic losses in livestock sector.
- A special fodder development Cell be established in the Department of Animal Husbandry with defined responsibility for indent fodder seeds production and distribution.
- Separate cadre/posts be created in the fields of Animal Husbandry/ Dairy for effective transfer of technologies.
- To Make dairy farming a profitable enterprise, incentives like removal of VAT from feed and feed ingredients, electricity rates for small and medium dairy plants to be on par with agriculture, low rate of interest on loan (3-4%), at least 50 % subsidy on small dairy equipment, production and supply of mineral mixtures, feeds fortified with micro nutrients, and animal vaccines be provided.
- Provision for KCC to be extended also to landless dairy farmers and all livestock keepers for availing loan/subsidy and other related facilities.
- The State Veterinary University should lay emphasis on vocational and other training programs for making available skilled trained manpower for livestock and dairy sectors.

- Since raising/ establishing of bull mother farms is rather costly, the involvement of known NGOs be encouraged for livestock developmental activities.

### **6.2.2 Action Points for Fishery**

- Natural calamity relief measures for fish farming to be extended as in case of crops.
- Comprehensive leasing policy of water bodies for aquaculture development is needed.
- Establishment of brood banks for cultivable species and creation of hatcheries and rearing infrastructure to be given priority.
- Ensuring adequate availability and certification of fish seed and fish feed quality in different regions of the State.
- Development of human resource at all levels and establishment of Department of Fisheries /College of Fisheries in the Veterinary University.
- Concerted efforts on conservation of fish biodiversity in the State.
- Diversification in fish farming by laying emphasis on high yielding fish stocks of sea bass, tilapia etc and to promote ornamental fishery for additional income.

### **6.3 Processing, Value Addition and Quality Improvement**

The State has some good agro- processing industries, mostly in and around cities. However, rural based low cost small scale agro-industries in the State are required for processable surpluses. These would not only help in reducing the post-harvest losses but would also generate much needed rural employment opportunities considerably. Hence, emphasis is required on creation of multi-purpose low cost rural based agro-processing complexes/ parks within a given time frame. For this, the Farmers Self Help Groups (SHG)/ Cooperatives/ producers companies are to be established with provisions of needed credit, Government policies/ incentives and rewards following specific area approach.

#### **Action Points**

- Establishing processing and value addition centres at strategic places in the rural areas/ production areas for fruits, vegetables, dairy, fishery and poultry in public-private-partnership (PPP) mode.
- Establishing agro-processing parks/ agro-processing complexes with multi-commodity processing units near big cities/ markets.
- Establishing food quality testing and phyto-sanitary laboratories.
- Helping farmers in marketing of their processed products (forward linkages).

- Special program for skill development, particularly farm women in primary and secondary processing in agriculture. Training in grading and packaging of horticultural crops should be a priority.

## 6.4 Market Reforms

Lack of modern marketing infrastructure and current restrictions under the Agricultural Produce Markets Act are the important factors responsible for poor returns to the farmers, especially in case of perishable commodities. Marketing system, therefore, will have to be made more efficient and pro-farmers as well as pro-consumers. There is need to devise strategy on market reforms in a given time frame, focussing action on the following:

### Action Points

- Immediate policy reforms in APMC Act to decentralise/ delink sale of fruits and vegetables, use of funds primarily to modernize market and delineation of resources for research support and technology uptake.
- Encouraging formation of commodity based cooperatives, self help groups (SHG), producer companies, etc.
- Build accessible roads, transport, storage, warehousing, fair and modern ICT enabled marketing/ trading facilities up to the terminal markets.
- Establish primary markets in rural areas at a distance not exceeding 10 km with cleaning, grading, pack houses, cool chain and quality control facilities.
- Strengthening retail marketing and kiosks for better utilization of products.
- Establish roadside markets at appropriate place and distance where farmers can directly sell their produce.
- Create ICT supported market/ intelligence facilities at all levels and access to information to farmers and primary producers, including provision of market advisory centres.
- Establishment of Haryana Bureau of Standards (HBS), on par with BIS, at the State level for easy certification.
- Establish specialized markets for fisheries, poultry, milk and animal products, spices, flowers and medicinal plants, fruits and vegetables at suitable/strategic places within Haryana with desired logistic support like air conditioned markets with refrigerated transport facility.
- Establishment of an APEDA type State of the art **Haryana Trading Centre** for promotion of export of agricultural produce in long term perspective.
- Establishment of timber market to promote agro-forestry.

## 6.5 Managing Risk in Agriculture

Agriculture is exposed to various risks and uncertainties. Agriculture is the only enterprise where nature has major say in its production and profitability. There is a need to prepare programs on managing risk and uncertainty including wide fluctuation in prices and climate change with a specific time frame following a mission mode approach.

### Action Points

- Strengthening of research on climate smart agriculture.
- Documenting and blending of traditional knowledge with modern science.
- Investment on water conservation and diversion of excess rain/flood waters to water deficit areas.
- Expansion and strengthening of existing insurance scheme to ensure benefits for all crops and animals.
- Strengthening of weather forecasting and climate service system.
- Facilities for surveillance and monitoring of disease outbreaks in crops and livestock.
- Initiation of State Insurance Scheme for major agricultural enterprises, besides availing of provisions under centrally sponsored scheme.

## 6.6 Institutional Reforms, Policies and Governance

Agricultural governance system must address the 'second generation' problems to improve both efficiency and effectiveness. Therefore, policy, institutional and management reforms will have to be encouraged for improving efficiency of the system. Mechanism shall be developed for convergence of various schemes/programs in agriculture and allied sectors run by different departments and ministries. A High Level Co-ordination Committee shall be constituted for effective convergence of development activities of all the departments and ministries related to agriculture sector under the chairmanship of Chief Minister. Other key issues for implementation of this policy would require:

### Action Points

- Creation of agricultural research fund out of the resources of Agriculture Marketing Board and Sugarcane Development Cess.
- Institute incentives and awards to farmers, scientists, development workers for innovations/ outstanding achievements.
- Ensure representation of experienced progressive farmers in all decision making bodies.
- Periodic capacity building of Officers/staff of State Agriculture, Horticulture, Animal Husbandry and Fisheries Departments and initiation of vocational training programs for farmers, women and youth.

- Agriculture being a specialised subject, the Departments of Agriculture, Animal Husbandry, Horticulture and Fisheries shall have only the senior technocrats as Heads.
- Follow district level planning harmonizing the efforts of other development related initiatives under NABARD, RKVY, ATMA, etc.
- Increased allocations for medium and long term loans for purchase of equipment and farm machinery. While giving loan waiver in future some incentives be provided to those who have paid back their lone in time.
- All subsidies be directly credited to the Bank accounts of the farmers.
- Rationalization of market charges, water and power tariffs, cargo charges and other taxes for crops, horticulture, fishery, livestock and poultry sector to be ensured.
- Establishment of Land Use Planning and Development Board for proper land use and valuation for required land acquisition.
- Legislation for contract farming and promotion of Company Act. Also needed reforms in APMC Act.
- Incentives to farmers for use of crop residues and organic recycling to improve soil health condition. Similarly, compensation for environmental services such as maximum land cover using Conservation Agriculture (CA) practices.
- Examine the possibilities for fixing minimum support price for some vegetables that are not highly perishable.
- Creating awareness among the farmers to take benefit of all development related schemes and associated obligations.
- Strengthening the information and communication system using local language and encouraging the media to bring agriculture to the main stream.

### **6.7 Ecology, Biodiversity, Environment and Natural Resource Management**

Management of ecology and environment is very important for sustainable agriculture. However, in search of higher production and profitability in the short run, this aspect has been generally ignored. Time bound programs shall be prepared and action taken for the protection, development and management of ecology and environment of the State for ensuring higher production, profitability and livelihood security in perpetuity.

#### **Action Points**

- Establishment of Natural Resource Management / Environmental Science Centres and strengthening of KVKs with multidisciplinary team of scientists to address location specific problems of Natural Resource Management.
- Building human resource through revisit of course curricula.

- Incentive to promote organic manure, bio-fertilizers, green manure, inclusion of legumes in crop rotation and balanced use of plant nutrients including INM on the basis of soil test values.
- All efforts and incentives to conserve and use rain water by following holistic watershed management.
- Promotion of Conservation Agriculture and farming systems' approach.
- Ban/disincentives to flood irrigation in crops and standing water in puddled rice.
- Promote laser land leveling, drip, sprinkler and furrow irrigation including other water saving devices.
- Promotion of agro-forestry, pisciculture and bio-drainage particularly under problematic soil and water conditions.
- Emerging treatment of industrial effluent, sewage and other problematic waters for irrigation.
- Diversion of flood or excess rain water to water deficit areas or water harvesting for recharge.
- Literacy program at school/Panchayat/institutional level and incentives to identify and save eco-friendly bio-agents.
- Incentives to promote and develop integrated and safe use of non-conventional energy (Geo, bio, wind, solar, geothermal) and have a target to meet around 15-20% of the total energy requirement.
- Incentives for conservation, characterization and protection of native livestock breeds.
- Complete all irrigation projects in pipeline before commissioning of new irrigation projects and promote regular monitoring and updating of database on irrigation potential created and utilized.

## **6.8 Adoption and Mitigation of Climate Change**

According to UN Frame Work Convention on Climate Change, agriculture accounts for around 13% GHG emission. The increase in deforestation in developing countries could raise its contribution between 26-35 % of GHG emission. In agriculture, puddled rice and livestock (cattle and buffalo) are the main sources of GHG emission. Thus, time bound adaptation and mitigation measures are needed urgently to reduce the adverse impact of climate change on agriculture.

### **Action Points:**

- Adoption of good agricultural practices, including Conservation Agriculture, water conservation, efficient use of nitrogenous fertilizers, direct seeded rice (DSR) /aerobic rice etc.
- Planting different varieties of same crops, changing planting dates and adapting practices to a shorter growing seasons.
- Establishment of community based biogas plants.
- Research on development and dissemination of flood, heat, frost and drought tolerant varieties.
- Efficient climate services weather forecasting and crop modelling as well as contingency planning.
- Control on deforestation and promotion of agro-forestry/ agro-horticulture.
- Improvement of nutrition and fodder management of ruminant livestock to reduce GHG emission.
- Promotion of carbon trading and credit at low interest rate for adoption of climate smart agriculture.

### **6.9 Reorientation of Agricultural Research and Education**

Agricultural research and education, in the context of emerging challenges of food and nutrition security, crop diversification, conservation and sustainable use of natural resources, globalization and agribusiness management, post-harvest processing, storage and value addition, bio-energy and climate change will need considerable reorientation and reprioritization. The curriculum of agricultural higher education shall be made broad based placing more emphasis on areas such as biotechnology, nano-technology, post-harvest technology, agro- meteorology, environmental science, computer science, information technology, IPR, international trade etc. Specialized trainings for entrepreneurship and vocational capacity building, especially of youth and women will receive priority. In order to create interest among youth, for agriculture as a profession, agriculture as a subject will also be taught in the schools. Agricultural research shall be made more demand driven and relevant rather than project oriented in order to ensure better livelihood of small holder farmers of the State.

### **Action Points**

- Reorientation of course curricula giving needed emphasis on cutting edge science and on technological advances.
- Building competent human resource to meet the future requirements. More emphasis shall be placed on vocational activities and entrepreneurial skills.

- Exposure to agricultural science at school level shall be made mandatory.
- While revisiting land grant system of education, the latest developments in international institutions and agricultural universities abroad shall be kept into consideration and needed expertise in specialized fields will be ensured through partnership development with best institutions.
- Need based and demand driven research will receive high priority in specific crops and commodities for which State has a niche and comparative advantage (ex: basmati rice, Murrah buffalo, *guar* etc) and also on low volume high value crops to ensure more income to the farmers.
- Greater thrust will be given on hybrid research, conservation agriculture, direct seeded rice, inter-cropping, post-harvest management, value addition, bio-energy, efficient use of poor quality water, seed technology, protected cultivation etc.
- Needed institutional strengthening will receive priority and allocation for AR4D will be tripled.
- Financial and functional autonomy, linked with proper accountability, will be accorded to Agricultural Universities and a Special Fund for R&D will be established for competitive research grant in priority areas.
- Keeping in view the important role of women in agriculture, women education will be accorded highest priority and needed incentives will be ensured.

## **7. Conclusion**

The Government of Haryana trusts that this State Agriculture Policy will receive fullest support of all sections of society. It will lead to an accelerated annual agricultural growth of more than 4 per cent. All out efforts will be made for its effective implementation so as to ensure increased income and profitability for improved livelihood of Haryana farmers. A detailed exercise to develop the Road Map around strategic areas specified in this policy will be undertaken on priority and needed resources shall be provided to achieve desired goals.

## Abbreviations

A	Advance Estimate
AR4D	Agriculture Research for Development
APEDA	Agricultural and Processed Food Products, Export Development Authority.
APMC ACT	Agricultural Produce Market Committee Act
ATMA	Agriculture Technology Management Agency
BICP	Bureau of Industrial Costs & Prices
C A	Conservation Agriculture
CDs	Compact Disc
CPR	Common Property Right
EXIM	Export and Import
F & V	Fruits and Vegetables
FMD	Foot and Mouth Diseases
FYM	Farm Yard Manure
GDP	Gross Domestic Product
GHG	Green House Gases
GI	Geographical Indicator
GM	Genetically Modified
HBS	Haryana Bureau of Standards
HES	Haryana Economic Survey
HR Practices	Human Resource Practices
HS	Haemorrhagic septicaemia
HYV	High Yielding Variety
ICT	Information and Communication Technology
IFS	Integrated Farming System
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
IPR	Intellectual Property Right
KCC	Kisan Credit Card
KVK	Krishi Vigyan Kendra
MGNREGA	Mahatma Gandhi National Employment Guarantee Act
MSP	Minimum Support Price
NABARD	National Bank for Agriculture and Rural Development
NCR	National Capital Region
NGOs	Non Governmental Organizations
NRM	Natural Resource Management
P	Provisional Estimate
PPP	Public Private Partnership
PPR	Pesti des petits ruminant
PV	Photovoltaic
PVP&FR	Plant Varieties and Farmers' Rights

Q	Quick Estimate
R & D	Research and Development
RKVY	Rashtriya Krishi Vikash Yojana
R-W	Rice-Wheat
SAIF	State Agriculture Innovation Fund
S & T	Science and Technology
SHG	Self Help Groups
T & D	Transmission and Distribution
TFP	Total Factor Productivity
UN	United Nations
VAT	Value Added Tax
WTO	World Trade Organization
WUAs	Water Users Association
WUE	Water Use Efficiency

