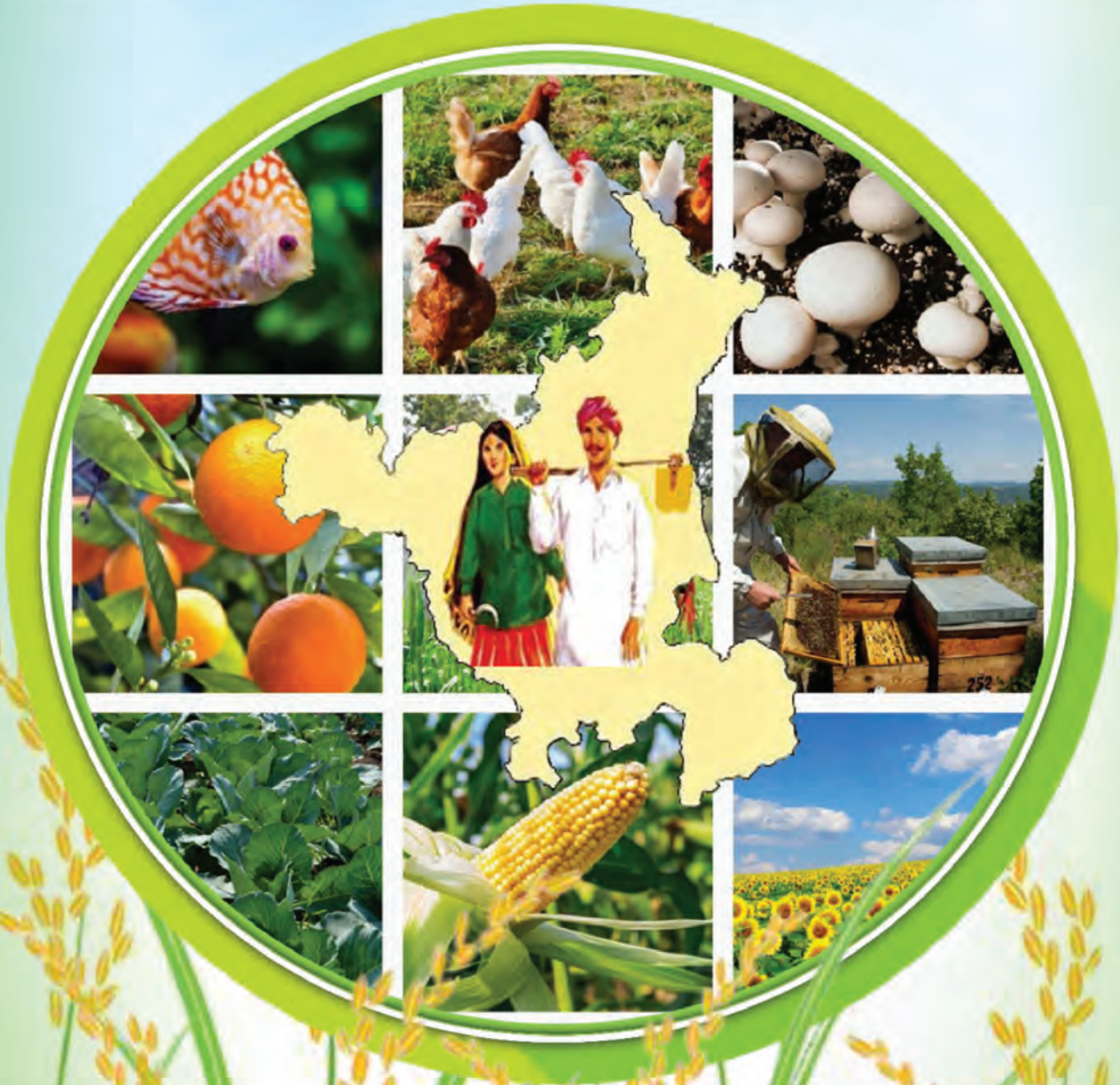
Report
of
Task Force
KISAN KALYAN NITI/FARMERS WELFARE POLICY WITH VISION - 2047



Haryana Kisan Kalyan Pradhikaran

Government of Haryana

Recommendations of the Task Force for

KISAN KALYAN NITI/FARMERS WELFARE POLICY WITH VISION-2047

2023

HARYANA KISAN KALYAN PRADHIKARAN
GOVERNMENT OF HARYANA

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THE TASK FORCE

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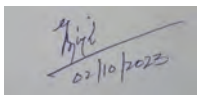

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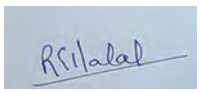

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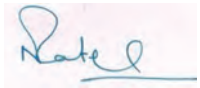

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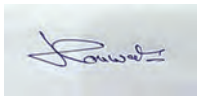

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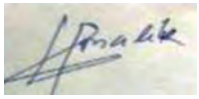

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Published by:

Haryana Kisan Kalyan Pradhikaran
Krishi Bhawan, Sector-21, Panchkula
Tel.: 0172-2551764
Website: www.hkkp.org.in
Email – Id: hkkppkl@gmail.com

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Sudhir Rajpal, IAS
Additional Chief Secretary to Govt. of Haryana,
Agriculture and Farmers Welfare Department

MESSAGE

Agriculture is the principal occupation of the residents of Haryana with around two-third of the population engaged in agriculture. The State has made tremendous progress since its inception in 1966 in which the contribution of agriculture and allied sectors has been significant. The food grain production has increased from 2.592 MT in 1966-67 to 18.321 MT in 2019-20. Almost 84% of the cultivated area in the State is irrigated now as compared to 37.08% in 1966-67. The cropping intensity has increased from 120.42 percent in 1966-67 to 184 percent in 2019-20. At present Haryana is contributing 16-18% of the total food production in the country with only 1.34% of the total geographical area of the country. Despite above achievements, several second generation problems such as decline in size of land holdings, depletion of natural resources, climate change, emerging pests and over use of chemicals, harvest management, processing, branding and marketing are posing serious challenges in agriculture.

The agricultural growth has been possible through the hard work of farmers and policy supports by the Government. Therefore it is need of the hour to facilitate our farmers with access to improved technology, credit, better input and more markets to incentivize them to produce better quality commodity.

It gives me immense pleasure to share that a Farmers Welfare Policy/Kisan Kalyan Niti with Vision-2047 document is prepared by Haryana Kisan Kalyan Pradhikaran. This document presents a roadmap for developed Haryana through sustainable agricultural practices and technologies for next 25 years. This document is well poised to meet the challenges ahead that transforms agriculture sector into the engine of growth of Haryana's economy by providing human resources, skills and technology for the sustainable development of State's agriculture. I hope that the document will help the policy makers in devising schemes and taking decisions to meet the challenges in the agriculture sector.

I appreciate the efforts made by Sh. Bhupinder Singh, CEO, HKKP, Chairman & Members of Task Force, officials of Haryana Kisan Kalyan Pradhikaran and all the stakeholders who are involved in preparation of this document.

(Sudhir Rajpal)

Bhupinder Singh
Chief Executive Officer
Haryana Kisan Kalyan Pradhikaran

FOREWORD

Agriculture sector plays a very important role in economic development and nation building. Haryana is nationally in the forefront of development of agriculture. The State has shown tremendous growth in the agriculture and allied sectors since its inception in 1966. The exploitation of resources however has led to various problems in this sector posing a serious challenge to the farmers' income and sustainability of agriculture.

There is a need to facilitate the farmers with access to improved technology, credit, better inputs and more markets to incentivize them. Promotion of sustainable agricultural practices to ensure good soil health, good quality of food and clean environment besides meeting the growing demand for organic and natural products within and outside the country is the need of hour. Haryana has very good network of roads and all producing areas are well connected to state or national highways through rural roads. The State also has geographical advantage of being in the vicinity of the National Capital which offers tremendous demand for high value products. The State can harness this advantage and transform its agriculture in a big way to raise income of the farmers. This will happen if appropriate marketing mechanism and climate for agri-business is improved in the State.

The Pradhikaran constituted the Task Force for the preparation of Kisan Kalyan Niti/ Farmers Welfare Policy with Vision-2047 with a mandate to study and make recommendations on most appropriate strategies for adoption for overall growth of agriculture and to catalyse the necessary policy changes that are needed to make the agriculture sector more vibrant, and strengthen the farmers of Haryana. The Task Force has prepared the present document enlisting several recommendations therein incorporating strategies for reinvigorating agriculture in all its aspects and to formulate strategies for reforms, innovation and technology diffusion.

It gives me immense pleasure to thank Dr. Gurbachan Singh and all the esteemed Members of the Task Force for their exceptional work and detailed study which has resulted in a report with sector specific recommendations. This report will surely help the policy makers, planners, researchers and administrators to initiate the necessary changes for improving the agriculture-based scenario of the State. I hope that the implementation of various recommendations will accelerate the growth of agriculture in Haryana.

(Bhupinder Singh)

Dr. Gurbachan Singh
Former Chairperson
Agricultural Scientists Recruitment Board,
Ministry of Agriculture and Farmers Welfare,
Agriculture Commissioner, Government of India,
Director, ICAR-CSSRI, Karnal

PREFACE

Haryana Kisan Kalyan Pradhikaran constituted a Task Force under the Chairmanship of Dr. Gurbachan Singh, Former Director, CSSRI, Karnal; Agriculture Commissioner, Government of India and Chairman, Agricultural Scientists Recruitment Board, Union Ministry of Agriculture and Farmers Welfare to prepare Kisan Kalyan Niti/ Farmers Welfare Policy with vision 2047. The other members of the Task Force included: Dr. R.S Dalal, Retd. Professor, CCSHAU, Hisar, Dr. Neelam Patel, Senior Adviser, Niti Ayog, New Delhi, Dr. Dharampal Malik, Professor & Head, CCSHAU, Hisar, Dr. Sajjan Singh, Principal Scientist, Central Institute for Research on Buffalows (CIRB), Hisar and Shri Kanwal Singh Chauhan, Progressive Farmer, Village Aterna, Sonipat.

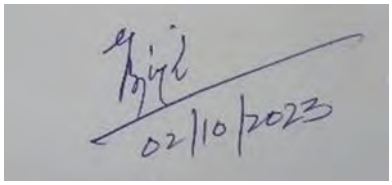
To prepare the Kisan Kalyan Niti with vision 2047, the Task Force held 12 meetings with stakeholders including meetings exclusively with farmers at Karnal, Rohtak, Gurugram and Sirsa where farmers from all districts, senior district level officers representing agriculture, horticulture, animal husbandry and fisheries departments participated. Two days brain storming session was held at CCSHAU, Hisar to seek feedback and suggestions related to agricultural research, education and extension system. In this meeting, Dr. B.R. Kamboj, Vice-Chancellor of CCSHAU, Hisar, Dr. Vinod Kumar Varma, Vice-Chancellor of LUVAS, Hisar, and Dr. Ramesh Kumar Goyal, Director Research, MPUAT, Karnal participated along with their senior officers and heads of Krishi Vigyan Kendras. Two meetings were held at Panchkula with heads of departments/ senior officers of agriculture, horticulture, animal husbandry, fisheries, irrigation and drainage, forestry, sugarcane, food & civil supplies, HSAMB, electricity, APEDA, MSME, University of Skill and Entrepreneurship Development etc.

The Task Force also had the opportunity to interact with national and international scientists, policy advocators, industry representatives, entrepreneurs and private sector representatives. The notable experts consulted included: Dr. Gurdev Khush, international rice breeder and World Food Prize Laureate, Dr. R.S. Paroda, Former Director General, ICAR and Secretary DARE, Dr. M.L. Madan, Former Deputy Director General (Animal Sciences), ICAR, Dr. P.C. Sharma, Director, ICAR-CSSRI, Karnal, Dr. Gyandera Singh, Director, ICAR-IIWBR, Karnal, Dr. M.L. Jat, Director, International Centre for Research in Semi-arid Tropics, Dr. Yashpal Sherawat, Country Coordinator, International Fertilizer Development Centre (IFDC), Shri Vijay Setia, Former President, Rice Exporters' Association of India and Shri Ravi Beri, Beri Udyog, Karnal. The feedback and suggestions received during the interaction

meetings with wide range of stakeholders have been incorporated in this document. Several valuable suggestions received through email and on the website of Kisan Kalyan Pradhikaran, Panchkula are also considered while drafting the present Niti.

The Kisan Kalyan Niti with vision 2047 document has four main sections. The first section deals with presumptions and benchmark indicators for drafting the policy. The challenges, opportunities and recommendations are covered in second section. Specific feedback and suggestions received from the farmers are listed in the third section. The fourth section deals with a road map for Niti document with vision 2047. The road map suggests what need to be implemented and achieved by 2028, 2037 and 2047.

Very valuable and considered suggestions the Task Force received during formal and informal discussions with Shri Bhupinder Singh, CEO, Kisan Kalyan Pradhikaran, Shri Amarjit Singh Maan, Adivsor Agriculture and Farmers Welfare and Shri Hardeep Singh Kadian, ex-DG, Agriculture, Haryana proved very useful in drafting the present policy for welfare of farmers of the State. We hope and believe that this document will prove highly useful to different departments of the State dealing with kisan welfare schemes in the State.



October 02, 2023

Gurbachan Singh
Chairman, Task Force

ACKNOWLEDGMENTS

The Task Force Chairman and Members are highly indebted to Hon'ble Chief Minister, Haryana, Shri Manohar Lal Khattar Ji for giving opportunity to prepare a Kisan Kalyan Niti with vision 2047 for the farmers of Haryana. In general, the States make agriculture policy where farmer is not kept at the central stage. It is the vision and mission of Hon'ble Chief Minister, Haryana that for the first time a Kisan Kalyan Niti is being prepared instead of State agriculture policy for making the farmers of the State prosperous and happy. We also thank Hon'ble Minister of Agriculture and Farmers Welfare Shri Jai Parkash Dalal for his visionary role and guidance in constitution of the Task Force and in drafting terms of reference. His concern and love for farmers of Haryana is clearly reflected in the mandate given to the Task Force. Thanks are also due to other Hon'ble members of the Haryana Kisan Kalyan Pradhikaran for their visionary role in constituting the Task Force. The Task Force is highly indebted and intend to place on record the logistic and other support provided by Shri Bhupinder Singh, CEO, Haryana Kisan Kalyan Pradhikaran, Panchkula for smooth conduct of the proceedings of the Task Force. In addition to informal discussions, he also participated in meetings the Task Force held with the farmers, senior officers of the State dealing with agriculture and allied sectors, in the two days' brain storming session held at CCSHAU, Hisar and offered very valuable suggestions. We also place on record the unconditional help received from heads of departments of agriculture & farmers welfare and other allied departments concerned with farmers welfare for deputing their senior officers for interaction with the committee. The participation of Shri Amarjit Maan, Advisor, Agriculture and Farmers Welfare in some of the interaction meetings and valuable suggestions is gratefully acknowledged. Thanks are also due to Shri Hardeep Singh Kadian, ex-DG, Agriculture, Haryana for providing valuable input about training and extension requirement for farmers of the State.

The Task Force is highly thankful to eminent scientists, agri experts and policy advocators including Dr. Gurdev Khush, World Food Prize Laureate, Dr. R.S. Paroda, Former, DG, ICAR and Secretary, DARE, Dr. M.L. Madan, Former DDG, ICAR, Dr. P.C Sharma, Director, ICAR- CSSRI, Karnal, Dr. Gyandera Singh, Director, IIWBR, Dr. M.L. Jat, Director, ICRISAT, Dr. Yash pal Sherawat, Country Coordinater, IFDC who participated in the interaction meetings and offered highly relevant feedback and suggestions. The suggestions received from Shri Vijay Setia, former President, Rice Exporters' Association of India and Shri Ravi Beri, Beri Udyog, Karnal are gratefully acknowledged.

The document would not have been complete without the input and suggestions the Task Force received from Dr. B.R. Kamboj, VC, CCSHAU, Hisar and Dr. Vinod Kumar Varma, VC, LUVAS, Hisar. We acknowledge with thanks their unconditional support and also for deputing their senior officers for interactions with the Task Force. We intend to thank all the farmers of various districts who spared their valuable time and participated in the

interaction meetings, and offered feedback and suggestions. The help provided by different institutions and organizations like International Veterinary Education and Research Institute, Rohtak, Gurbachan Singh Foundation for Research, Education and Development, Karnal, CCSHAU, Hisar, Central Institute of Cotton Research, Sirsa, Krishi Vigyan Kendra, Gurugram and Horticultural Training Institute, Karnal and others is gratefully acknowledged. Last, but not the least, the Task Force profusely thank Dr. Sanjay Yadav and Smt. Vandana, Research Fellows and other staff of Haryana Kisan Kalyan Pradhikaran for all the logistic and other support provided to the Task Force. The formal and informal support provided by one and all for preparation of the present document is gratefully acknowledged.

Chairman and
Members of Task Force

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Constitution of Task Force

The Haryana Kisan Kalyan Pradhikaran is pleased to constitute the Task Force for preparation of Kisan Kalyan Niti/Farmers Welfare Policy with Vision-2047, as under: -

1.	Dr. Gurbachan Singh, Retd. Director, CSSRI, Karnal	Chairperson
2.	Dr. R.S. Dalal, Retd. Professor, LUVAS, Hisar	Member
3.	Dr. Neelam Patel, Sr. Adviser, Niti Ayog, New Delhi	Member
4.	Dr. Dharampal Malik, Professor & Head, CCSHAU, Hisar	Member/ Convener
5.	Dr. Sajjan Singh, Principal Scientist, CIRB, Hisar	Member
6.	Sh. Kanwal Singh Chauhan, Progressive Farmer, Village Aterna, Sonipat	Member

Terms of Reference: -

1. To review the current status of the agriculture & allied sectors in the State and suggest measures for further improvement as per the future demand of the State.
2. To analyze the current support system (schemes, policies, technical and infrastructural support) for the agriculture & allied sectors from the State/Central Governments and propose methods for further improvement of these sectors in the State.
3. To assess the present status of training programs and extension facilities for farmers and suggest measures for skill development of persons engaged in agriculture & allied activities.
4. To review the current status of present marketing system, available infrastructure and policies, and suggest measures for further improvement in linking the farmers to the market.
5. To review the status of research and development and suggest measures to address current gaps as per the specific needs of the farmers.
6. To recommend most appropriate strategies for adoption for overall growth of agriculture sectors and the farmers in the State.
7. The Working Group will hold consultation meetings with farmers, scientists, entrepreneurs, policy makers, etc.

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1. Executive Summary

The Task Force held 12 meetings with different stakeholders including farmers and their feedback & suggestions received in the interaction meetings have been incorporated in the repot. The document has four main sections. The first section deals with presumptions and benchmark indicators for drafting the recommendations. The challenges, opportunities and recommendations are covered in second section. Specific feedback and suggestions received from the farmers are listed in the third section. The fourth section deals with the road map indicating the targets to be achieved by 2028, 2037 and 2047. Most significant issues, opportunities and recommendations dealt in the Niti document are summarized below.

1. Availability of good quality water in adequate quantity for use in agriculture will be highly crucial for attaining food and nutritional security in the near future. The State, on an average, receives about 545 mm of rainfall, of which hardly 30 to 35% is conserved and used for agriculture. There seems vast potential for in-situ and ex-situ rain water conservation. Reuse of waste waters including domestic and industrial effluents in agriculture will substantially increase. Development of multi-enterprise models for multiple use of water in agriculture including integration of crops, fisheries, dairy, horticulture, mushroom, bee keeping; rain water harvesting for ground water recharge and efficient use of irrigation water in agriculture is called upon. There is need to construct reservoirs and ponds, their banks/dykes planted with forest and fruit trees in foot hill areas of Shivalik for in-situ conservation of rain water. Ponds need to be dug out in farmers' fields so that at least one pond of size half acre to one acre represent every 10 to 20 acres of land for rain water conservation for ground water recharge and for supplementing irrigation water. There is strong need for constructing mini reservoirs with facility of ground water recharge tubewells and wells along major rivers such as Yamuna, Markanda, Ghaggar and Tangri.

2. There is strong case for extending subsidy for promotion of furrow irrigated raised bed planting (FIRB) in rice-wheat crop rotation areas on the pattern of sprinkler and drip irrigation. There is also a need to develop short duration water efficient crop varieties, replacement of rice areas with low water demanding crops such as cotton, soybean, maize, millets, oilseeds and pulses. An underground water quality map of the State should be prepared with focus on salinity and heavy metal contamination. Planning for 2047 will necessitate the need for complete analysis of waste water at the source point and its current use at the site, to develop a base line for action. Keeping in view the present availability of sewerage water in major cities and towns of Haryana and likely availability of such water by 2047, a road map for its treatment for domestic, industrial and agriculture use is called upon.

3. At present, about 9 percent area of Haryana is affected with water logging and salinity. The CCSHAU need to prepare a fresh soil quality/fertility map of the State to revise fertilizer recommendations including micronutrients and other trace elements. There is strong need to develop crop varieties having efficient nutrient mining and uptake

systems so that they give same yield with 20% to 30% less fertilizer application. Fixing bench marks in all districts of the State to monitor build-up of heavy metals in the soil and devising timely preventive and management strategies is need of the hour. Intensification of nanotechnology and sensor based research to increase use efficiency of nutrients and water is urgently needed.

4. The future planning to make agriculture resilient to climate change in the State need to focus on screening of germplasm for traits linked with abiotic stresses and development of multi-stress tolerant crops and varieties using gene pyramiding approach-either by Marker Assisted Selection (MAS) or by transgenics. Development of multi-enterprise agriculture systems to cover risk of crop failure, to increase carbon sequestration/carbon trading and to ensure multiple use of resources by integrating livestock, fisheries, horticulture, mushroom and bee keeping etc is called upon. Establishment of crop weather watch group in the department of Agriculture and Farmers Welfare at Panchkula, establishment of a committee at the State level to study the district wise impact of climate change on agriculture and behavior of microclimates within the districts and blocks is urgently needed.

5. The climate change is likely to seriously impact the biodiversity resources of the State. An intensive and deeper understanding of baseline information on biodiversity trends and threats is urgently required in the State and we need to develop strategies for their management. The Government needs to strengthen existing Biodiversity Authority for sustainable conservation and use of biodiversity wealth of the State.

6. Release of toxic and poisonous gasses and effluents from the industries has become a major concern for environmental pollution. The produced toxic effluents are released into major rivers, water courses, drains, ponds and dumped in low lying areas in the State. This calls for a policy initiative wherein the State may ask all factory owners in the State to get audits of safety norms done periodically.

7. Chemical input based agriculture in last about four decades has resulted in contamination and pollution of soil and water resources, recycling of heavy metals and toxins in soil-water-atmosphere-animal-human chain, development of resistance in pests and weeds & emergence of new diseases. There is need to reverse the damage already caused to our natural resources due to excessive use of chemicals in agriculture food system in the past and to tune agricultural production practices in harmony with nature. Promotion of organic and natural farming in the State seems an option of great promise to make agriculture sustainable and eco-friendly.

8. There is an urgent need to increase forest area in the State which is dwindling at 1.5 to 3.0 percent. Integrating trees with agricultural crops is an option of great promise to increase forest cover in the State and help sequestering green house gasses to make agriculture climate resilient. The Aravali hills in the south of the State offer good scope for increasing green cover of the State. *Prosopis juliflora* based business models need to be developed for promotion of bio saline agroforestry to generate

biomass for electricity generation and as an alternate feed and food resource. There is strong case to promote bio drainage technology to lower the water table and make economic use of such abandoned lands. All land along the rivers, canals, roads, drains and railway tracks offer good opportunity to go for large scale tree plantations to increase forest area in the State.

9. CCSHAU, Hisar need to focus mainly on developing extra short duration varieties of rice with seed to seed total duration of 120 to 130 days. Weed management strategy in direct seeded rice and zero tilled wheat needs to be standardized. Some of other research gaps identified by the committee included: (a) Upgradation of DSR technology to make it farmer friendly; (b) development of Tur, Urad, Moong, Gram and lentil varieties and hybrids with yield advantage of 25-30% over the present production level; (c) focus on improvement of Desi cotton research programme to develop high yielding pest and water logging resistant varieties; (d) development of Bt cotton material having tolerance to water logging and salinity in the State; (e) development of seed nurseries of promising high yielding sugarcane varieties using tissue culture and single bud multiplication techniques, development of short duration sugarcane varieties with higher sugar recovery, tolerance to water logging and salinity and resistance for red rot disease; (f) development of high yielding pest resistant varieties in sunflower, mustard and bajra.

10. Effective policy for certification of nurseries of fruit trees in general and screening for nematode infestation, establishment of centres of excellence and certified nurseries of horticultural crops in all districts of the State is need of the hour.

11. There seems no other option but to reduce area under rice cultivation in Haryana and to shift to other low water requiring alternate crops. The promising crops which have the potential to replace rice in the State are: maize, soybean, cotton, pulses, oilseeds and vegetables. There is strong need to develop diversification plan keeping in view cluster of villages/block/district concept instead of one blanket plan for the whole State. This plan should be prepared keeping in view potential of alternate crop which can replace rice and give almost same returns to the farmer as he receives from rice cultivation. Involvement of private sector in a big way to create infrastructure in cluster of villages/blocks/districts for procurement, storage, processing, value addition, marketing and trade of the diversified crop/ crops is necessary. Assured market and MSP for crops such as cotton, maize, soybean, canola, mustard, oilseeds, millets and pulses will be necessary to see diversification happened in the State.

12. Special emphasis is needed for in-situ management of crop residues to stop burning and resultant pollution of air. To promote use of crop residues for mulching, provision of subsidy on the same pattern as given on plastic sheets need to be extended for use of paddy biomass as mulch. A separate subsidy scheme needs to be implemented for crop residue management for small land holder farmers in the State. Identification, improvement and value addition in top feed fodder trees and bushes like genus

Prosopis and Opuntia growing naturally in waste and abandoned lands need to be promoted.

13. The government may start planning early in consultation with central government so that the fertilizers and other inputs are made available to the farmers at least one month in advance of sowing of the crop. In spite of good intentions at the government level, the trade of spurious pesticides, weedicides, seed and fertilizers is flourishing. SOPs should be put in place for strict implementation of Fertilizer, Seed and Pesticide Acts for punishment of the traders engaged in the business of spurious agricultural inputs.

14. There is serious problem of wild animals like blue bulls which cause extensive damage to crops like maize, pulses, fruits, vegetables and fodders. A special scheme needs to be formulated to help the farmers for establishment of bio fence involving trees of the genus Prosopis, thorny cactus, karonda, mehndi, bamboo etc., and a combination of bio and barbed wire fencing of their agricultural fields.

15. Livestock contributes about 18% of total green house gasses emissions. There is need to improve microbial rumen digestion efficiency. Establishment of State level disease surveillance and forewarning mechanism to ensure timely preventive actions to avoid outbreaks of animal diseases is need of the hour. LUVAS has taken a good initiative of mobile van for at spot milk processing, which needs to be further upscaled at the State level. Establishment of animal husbandry extension service to the farmers on the pattern of agricultural extension is need of the hour. State of the art cattle mobile hospital plan can be formulated by the animal husbandry department of the State. There is strong need to prepare village based genetic and production inventory of all elite bulls and buffaloes in the State. There is a strong need to monitor and regulate the supply of artificial milk in the State by the enactment of law.

16. There is great scope of expending area under saline aquaculture shrimp farming.

17. Energy is likely to become a limiting factor for agriculture in near future. Major emphasis will be required to generate solar, water, wind and biomass based renewable energy. Lot of cow dung is produced daily in Gaushalas in the State. This cow dung can be effectively converted into Bio CNG gas production by establishing a bio gas generation plant in each of the Gaushalas.

18. There is an urgent need to establish a nutritional garden, a recreation and physical exercise facility in the villages as available in the parks in the cities, establishment of village pond/ ponds having capacity to store all excess rainfall which falls in the boundary of the village and planting of fruit, timber, herbal and other high value crops on the dykes of these ponds. Implementation of 'one village one sport' concept, separate gymnasium facility for boys and girls; establishment of physical and/ or e-library facility, internet connection and medical health card of all residents in the village should be promoted. To meet energy need of each village including lighting

of village streets on the pattern of cities, solar energy generation facility should be established in each village.

19. There is need to develop and standardize machinery to suit small farmers. Development of farmer friendly rice transplanter, cotton picking machine to suit varieties grown in the State and wheat sowing machine in ridge furrow geometry is need of the hour.

20. The State government may consider establishment of State Research Fund on the pattern of National Research Fund to promote excellence in science in general and agricultural sciences in particular. This fund may be used for upgrading skills and capabilities of State scientists through their short and long term trainings at centres of excellence in India and abroad. This fund can also be used to build centres of excellence around result oriented innovated scientists, entrepreneurs and farmers. Special quota for farmers' children for higher education in universities need to be created using this fund.

21. In all ongoing government schemes of agriculture, horticulture, animal husbandry, fisheries, agro-processing, rural industry etc., wherever subsidy is provided to the farmers/entrepreneurs, the Ex-servicemen may be extended the subsidy at the same rates as applicable to SC beneficiaries.

22. There is strong need to establish a Single Window System for farm entrepreneurs on the pattern of industry. This window should receive all applications at one place, get them processed by different departments in a time bound manner. NABARD may be requested to develop a scheme for financing by banks of integrated farming models developed by research Institutions. Subsidy for different components of the system may be merged.

23. Looking into the rising prices of agri-inputs, the MSP of all crops should be fixed keeping 80% profit margin over and above the cultivation cost. Government may consider covering all perishable commodities under MSP on the pattern of other grain crops. This change will be difficult but needed in the interest of farmers' welfare.

24. There is need to revive Co-operative Societies and strengthen them by providing one time grant package. The facilities created under the Co-operative Societies in the past should be upgraded keeping in view the present day need of storage, marketing and processing of agricultural commodities. There is need for a state level institute for post-harvest management of agricultural produce on the pattern of CIPHET, Ludhiana.

25. Post-harvest wastage in fruits and vegetables range between 15 to 35 percent and in case of food grains is 5 to 15 percent. There is strong need to make policy incorporating development of post-harvest processing facilities and creation of cool chain infrastructure in cluster of villages, block and district level mode. The individual farmers should be encouraged by providing incentives to develop primary processing facility to manage the perishable commodities they are growing. Road network, water

quality and irrigation & proximity to New Delhi airport strongly favour production of high value export-oriented products in Haryana. Harnessing these opportunities and potential, require a new vision to bring changes in production portfolios and develop value chain to integrate farm production with consumption and export.

26. General recommendations : Visits to centres of excellence in India and abroad should be arranged for farmers.

- The existing infrastructure available with the farmers should be considered instead of imposing the condition of construction of new infrastructure to house the animals while sanctioning dairy loans.
- The procedure to obtain loan by FPOs needs to be simplified.
- The KCC limit should be raised from Rs. 3.0 lakhs to Rs.6.0 lakhs with the same rate of interest as applicable at present.
- The search report fee taken by the banks for sanctioning agricultural loans to the farmers should be waived off.
- All water courses including drains should be cleaned before April every year and made free of any deposited silt in the minors/canals.
- There should be no GST on purchase of agricultural inputs including machinery.
- MGNREGA should be linked with agriculture and MGNREGA activities should not be started during June, July, October, November and April months as it coincides with peak labour requirement for transplanting/ sowing/ harvesting of major staple rice and wheat food crops.
- For installation of solar pump, guarantee contract with the company is signed only for five years which should be increased to 10 years.
- Meri Fasal Mera Byora portal should be made more user friendly.
- The portal for registering vegetables should be kept open depending upon vegetable availability as vegetables come for marketing at different seasons in different districts.
- The electricity tariff for processing units established by farmers like dairy, mushroom, agri-business units should be charged as per tariff charged for domestic electricity consumption.

2. Presumptions and benchmark indicators for drafting the policy

- The chances of increasing area under different individual crops, commodities and enterprises in future seem remote. Emphasis will be required to re-orient from single crop to multi enterprise agriculture to make multiple use of limited resources in the same land. For example, horticulture, forestry, livestock etc. will have to be integrated with crops.
- Water will be the most limiting factor for food, nutrition and environmental security by 2047. Major efforts will be required for in-situ and ex-situ harvest of each drop of rain water that falls in the boundary of the State.
- The only workable and practical solution to double farmers' income is to streamline MSP, procurement, storage, processing, value addition, trade and export of agricultural and allied sectors' products.
- State is likely to face an acute shortage of progressive and innovative farmers and elite rural youth by 2047 who are moving abroad to seek greener pastures for their permanent settlement abroad.
- The business of spurious agricultural inputs and food items including manufacture of artificial milk in the State is flourishing. Incidences of serious ailments like cancer associated with consumption of adulterated food have increased many folds during last three decades and likely to increase further in the absence of any special efforts. There will be strong need to strengthen the present Act and authorities for effective implementation to check the menace of spurious inputs and adulteration in food items.
- Frequency of weather-related aberrations due to climate change such as floods, droughts, heat and cold waves, cloud bursts, storms associated with high speed winds, diseases and pests, unexpected rainfall events etc. has increased in the recent past and is likely to increase many fold by 2047. All out efforts will be required to make the State agriculture and farmers resilient to climate change.
- There will be need to shift agricultural research focus from individual crop, commodity and enterprise-oriented research to multi-disciplinary, problem solving, farmer participatory research under actual field conditions.
- Shift of about 50 percent area under water guzzling rice crop to low water demanding short duration crops like cotton, soybean, maize, millets, pulses, oilseeds etc. by 2047 will be absolutely necessary. To make this happen, the State government will need to formulate special crop diversification plan and policy.
- The State is amongst the states having lowest area under forest cover (about 3%). For ecological stability, the State need to have about 33% of the total

area under tree cover. There is need to integrate trees in all landscapes including growing with crops in a unified agroforestry system to have at least 15 to 20% area under tree cover by 2047.

- The State has made big investments in creating infrastructure facilities in the area of agriculture, health, education, medical education and rural development. Several State-of-the-art facilities are not functioning to the desired level due to paucity of competent human resource in adequate numbers. In future, more emphasis need to be given to utilize and upgrade already established facilities and to equip them with competent human resource rather than making investments to create more facilities.
- The global demand for import of elite animals mainly Murrah buffalows from the State is increasing day by day. The State need to cash upon this. There is strong need for large scale production of elite Murrah bulls and heifers for export purpose.
- There is need to create amenities in villages at par with urban areas to retain youth in villages to adopt agriculture as self-employment profitable profession.
- There is need to establish a panel of highly competent, experienced and visionary experts called Think Tank belonging to the broad disciplines of Agriculture, Horticulture, Livestock, Agri- business and Agricultural marketing in Kisan Kalyan Pradhikaran to advise the government on issues related to welfare of farmers.
- There is strong need for inter-State collaboration to address following issues of common interest to adjoining States.

    a. Management of Shivalik foot hill areas: Himachal Predesh, Haryana, Panjab and J&K.

    b. Management of salinity and water logging: Haryana, Panjab and Rajasthan.

- Small and marginal farmers and landless labourers are in serious debt and unable to earn livelihood from small land holdings they cultivate. One time relief by waiving off loans of farmers cultivating less than 2.5 acres of land by the government will provide the much needed relief to the formers.

3. Basic information of the State

3.1 Geographic location and climate

Haryana as a State came into existence on 1st November 1966. Haryana is a landlocked State in northern India. The State is one of the two newly created States carved out of Punjab. It is bordered by Punjab and Himachal Pradesh in the north and by Rajasthan in the west and south. The perennial river Yamuna defines its eastern border with Uttarakhand and Uttar Pradesh. Haryana surrounds Delhi on three sides. Consequently, a large area of Haryana to her advantage is included in the National Capital Region.

The State, located between 27º39' and 30º35' N latitude, and between 74 º28' and 77 º 36' E longitude, is part of the north western arid and semi-arid plains with an average rainfall of 545 mm that ranges from 1200 mm in the extreme north-east to less than 300 mm in the arid west. The State is bounded by Shivalik hills in the north, river Yamuna in the east and Aravali hills in the south. More than 98% area of the State is covered by alluvial plains including the western deserted terrain of sand dunes. River Yamuna and Ghaggar flood plains constitute a large part of the State and the entire area is covered by three basins namely, Yamuna basin (16330 sq. km.), Ghaggar basin (10675 sq.km.) and inland basin (17207 sq.km.). The altitude in the State varies from 190m to 1200m above mean sea level.

3.2 Land use pattern

The total geographical area of the State is 4.42 million ha sharing 1.34% of geographical area of India. Forest area in the State was 2.26 % of total area in 1970-71 which increased to 3.87 % in 1992-93 and declined to 2.60 in 2000-01. The land used for non-agricultural purposes at the time of formation of State was 1.0 lakh ha only and it increased to 5.42 lakhs ha at present due to expanded infrastructures like state and national highways, speedy growth in residential activities in NCR region and industrialization. The cultivated area is around 80%, of which about 84% is irrigated. The flat arable land is irrigated with ground water extracted with submersible pumps and tube wells, and by surface water through extensive canal system. The average size of holding in State was 3.89 ha at inception of the State which declined to 2.22 ha in last five decades (Agriculture Census 2015-16). It has further declined and at present about 50% farmers in the State cultivate less than 2 ha land.

3.3 Agricultural Zones of the State

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 Sonipat. 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. It accounts for nearly 39 percent of the total area of the State.

Zone-III:

It consists of 7 districts, namely Bhiwani, Charkhi Dadri, Mahendergarh, Rewari, Jhajjar, Gurugram and Nuh. It covers nearly 29 percent of the total area of the State.

The areas falling under Zone -I and Zone -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 has serious problem of soil and water erosion and hence it is suitable for agro-forestry and agri-horticulture systems. Zone-III is having major area under pearl millet, rapeseed-mustard & is also suitable for arid-horticulture. Nuh area is more suitable for agro-forestry, sheep and goat rearing.

3.4 Occupational distribution of work force in Haryana

The occupational distribution of workforce in Haryana reflected a negative growth rate (-13.43%) for workforce in primary sector in a span of 38 years (1980-2018) and positive growth in secondary (12.28%) and tertiary sectors (19.34%) of economy during the same period. All the indicators of structural change in Haryana prove that the State's economy has undergone structural change, hastening the economic growth rate, but reducing the significance of agriculture in the development process. The employment opportunities have increased in secondary and tertiary sectors over the period.

3.5 Rural population

At the time of inception of the State, the share of rural population was 84.32 % of total population which declined to 65.12% in 2010-11. Gradual changes in urban and rural population are recorded where urban population got almost doubled and rural population reduced by about 20 percentage points during this period in the State. The decline in rural population is 5.87 % since 2001 and it is expected to come down further in future due to better employment opportunities and civic amenities in the urban areas.

3.6 State of the economy

Haryana is one of the leading states in terms of industrial production, especially passenger cars, two-wheelers, mobile cranes and tractors. State relishes first position in the production of basmati rice and productivity in pearl-millet and rapeseed & mustard. Murrah buffalo and basmati rice are the vanity possessions of the State. Haryana is the second largest contributor of food grains to central pool, largest exporter of basmati rice (more than 60 percent of the export of basmati rice in the country), third largest exporter of software and one of the preferred destinations for IT facilities.

The State has invested in the development of world class infrastructure facilities such as Special Economic Zones (SEZs), Kundli-Manesar-Palwal (KMP) global corridor and Delhi-Mumbai Industrial Corridor (DMIC). Haryana enjoys a locational advantage, with nearly one-third of the State's area under the National Capital Region (NCR), a prominent trade and consumption centre. The State offers a wide range of fiscal and policy incentives for businesses under the Industrial and Investment Policy, 2011. The Haryana State Industrial

and Infrastructure Development Corporation Ltd (HSIIDC) is the State's premier industrial promotion and investment facilitation agency, responsible for providing reliable and efficient facilities for entrepreneurs investing in the State.

3.7 Agriculture and allied sector economy

Over the years, the State has followed progressive policies relating to augmenting investment in agriculture, strengthening of R&D system, public distribution system, irrigation development, land acquisition, subsidies towards credit and power use, infrastructure like roads, regulated markets, power generation and supply, etc. These progressive policies, combined with proactive farming community, have contributed to a very sturdy growth in agriculture.

Gross State Value Added (GSVA) of Haryana is estimated at Rs. 7,60,935.00 crores in 2021-22. The growth in agriculture and allied sectors, industry sector, and service sector led to 10.10% overall growth of GSVA of State at constant (2011-12) prices in 2021-22 against growth of 6.70 per cent at country level.

At the time of formation of State, its economy was primarily an agrarian economy. During 1969-70, the contribution of agriculture and allied sectors (crops, livestock, forestry and fishing) in the GSDP at constant prices was the largest (60.70%), followed by services (21.70%) and industry (17.60%) sectors. During the period of 37 years (1969-70 to 2006-07) intervening 4th and 10th Five Year Plans, industry and services sectors registered higher average annual growth than the agriculture and allied sectors which resulted in the increased share of industry and services sectors and consequently share of agriculture and allied sectors in the GSDP declined from 60.70% in 1969-70 to 21.30% in 2006-07. High GSVA growth without sustained and rapid agricultural growth is likely to accelerate inflation jeopardizing the larger growth process. Therefore, the growth of agriculture and allied sectors continues to be a critical factor in the overall performance of the economy. The estimates of agriculture and allied sectors indicate that the growth rate increased from 8.80 per cent in 2015-16 to 10.40 % in 2018-19 but it fell drastically to 1.60 % in 2021-22.

3.8 Per capita income

The per capita income of the State at current prices was only Rs. 608 in 1966 and increased to Rs.25,484 in 2000-01. After that, it has increased multi fold and at current prices, it has reached to the level of Rs. 2.64 lakhs against national per capita income of Rs.1.50 lakh, during 2021-22. The increase in per capita income resulted due to growth in agriculture and allied sectors, expansion in IT sector and industrial activities.

3.9 Concerns in agriculture and allied sectors

Notwithstanding these very impressive successes in agriculture sector in the State, various concerns like decreasing size of farm holdings, decreasing cultivable area, increasing soil salinity, declining as well as rising water table, imbalanced use of fertilizers, micro-nutrient deficiency, harsh climate, low forest cover, considerable area under rain fed condition (about 16%), lack of processing and value addition facilities, storage constraints and

shortage of labour for farming operations are existing. All these issues are adversely affecting crop productivity enhancement. There is significant productivity gap in the field crops, horticultural crops and livestock. The State is deficient in pulses (except gram), vegetables and fruits. There is deceleration in total factor productivity particularly in rice. A lot of work needs to be done in case of land reforms, capital investment for infrastructure development, natural resource management, marketing, processing and value addition, environmental improvement by tree plantation, risk management, agricultural credit, insurance and agro-advisory services to the farmers. The State is yet to harness its comparative gain 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 predicament of farmers, particularly small and marginal, women and agricultural labourers, in terms of income, profitability, sustainability and overall livelihood security, is a matter of serious concern to policy makers, planners and development agencies. In the backdrop of these concerns, the proposed Krishi Kaylan Niti with vision 2047 will focus on agriculture and its allied sectors ensuring enhanced investment, improved production, productivity, sustainability, profitability and welfare of farmers.

3.10 Production and productivity of major crops

Agriculture is an important sector of the State's economy, and majority of the population is directly or indirectly dependent on agriculture and its allied activities. Accordingly, the State has accorded high priority to agriculture sector since its inception. Strong infrastructure facilities such as rural electrification, extensive network of canals and roads, development of market yards, better access to financial institutions etc. were created which provided much needed support to agriculture development in the State. Creation of these facilities together with agricultural research support and excellent extension network to disseminate latest information related to improved farm practices for farm community yielded tangible results. The State has been converted from a food deficient to a food surplus State.

The net sown area under irrigation increased from 43 % in 1970-71 to 94.90% in last five decades (1970-2020). At the time of inception of the State, major crops grown in the State were paddy (4.17%), wheat (16.15%), pearl millet (19.42%), gram (23.09%), cotton (3.97%), rapeseed-mustard (3.26%) and sugarcane (1.53%), sharing 71.59% of total cropped area (45.99 lakh ha) in the State. The main crops cultivated in the State now are paddy (23.36%), wheat (36.06%), pearl millet (9.10%), gram (0.62%) cotton (11.03%), rapeseed-mustard (9.46%) and sugarcane (1.53%), sharing 91.16% of total cropped area (65.28 lakh ha) in the State in 2020-21. The area increased under these crops, except gram, due to assured market, procurement by government agencies and their economic returns.

The area under horticultural crops (fruits, vegetables, spices, flower, aromatic and medicinal plants) in the State was only 1.15 % of the total cropped area (59.19 lakh ha) in 1990-91 which increased to 8.29 % of total cropped area (65.28 lakh ha) in 2020-21. The increase

in area under high value crops is recorded due to improved production technologies and demand in Delhi & its adjoining urban areas as well as exportable demand.

The cropping intensity also improved from 139 % to 178 % in three decades (1970-2001) and it further increased to 185% in 2019-2020 due to expanded irrigation facilities. The food grain production has increased tremendously from 25.92 lakhs tonnes in 1966-67 to 185.91 lakhs tonnes in 2020-21.The major contribution in foodgrains production came from rice and wheat due to increased area coverage and enhanced productivity of both crops. The productivity of all major crops like rice (3.18 times), wheat (3.48 times), pearl millet (5.68 times), gram (1.98 times), cotton (1.60), mustard (4.89 times) and sugarcane (2.52 times) increased greatly between 1966-67 to 2020-21. The productivity of other crops like barley, urad bean, moong bean, lentil etc. grown in the State also increased over the period. The increase in crop productivity is due to use of quality seed, seed replacement rate, adoption of improved production and protection technologies and mechanization of farm operations. The area under coarse cereals except pearl millet, oilseeds (excluding mustard) has declined over the period.

3.11 Agriculture production scenario in 2047

The Task Force has made tentative estimate of food, sugarcane, cotton, fruits and vegetable production scenario by 2028, 2038 and 2047. The figures are reported in table below: -

Projection of Farm Produce in Haryana

Crop	Production (,000 tonnes)		
	2028	2038	2047
Rice	6207.40	8402.96	11035.76
Wheat	14003.97	16305.11	18697.73
Bajra	1099.75	1254.36	1412.00
Maize	10.70	6.63	4.31
Jowar	23.79	22.15	20.77
Total cereals	21283.61	25553.75	30124.71
Gram	28.68	18.55	12.53
Total pulses	56.03	39.94	29.46
Total Food grains	21307.34	25495.65	29964.64
Mustard	1353.50	1735.85	2171.50
Total oilseeds	1385.87	1770.95	2208.23
Cotton	2797.65	3651.58	4640.86
Sugarcane	7077.00	6694.82	6368.55
Fruits	2563697.78	6842654.16	16555663.03
Vegetables	12260022.37	22423150.36	38608369.30

The increase in productivity is expected with improved seed replacement rate (SRR) and varietal replacement rate (VRR), improving soil fertility by inclusion of cover crops/pulses and use of bio-fertilizers and manures, development of hybrid/high yielding varieties having tolerance or resistance against biotic and abiotic stresses, use of recommended nutrients usage, use of drones, remote sensing, nanotechnology, biotechnology and genetic engineering approaches, adoption of improved agronomic practices etc. At present, the supply/production of all staple foods, cash crops (cotton, sugarcane) and edible oils except fruits and vegetables is in excess over the consumption and the same pattern is likely to exist in future.

Haryana has a very good network of roads and all crop producing areas are connected to state or national highways through rural roads. The State also has geographical advantage of being in the vicinity of the metropolitan city of Delhi which offers tremendous demand for staple food and high value perishable products. The State also has reasonable quantity and good quality water accessible for agricultural uses. This type of natural resource endowment coupled with very good infrastructure offers very favourable supply side prospects for production of farm products. Similarly, large market in Delhi in its neighborhood with millions of consumers willing to pay for quality and attribute-based products, offers tremendous scope from demand side. Though, some efforts have been made to promote high value products but full opportunity of their production and value addition is yet to be grasped by State of Haryana. The State can harness this gain and transform its agriculture in a big way to nurture income of farmers. But this will happen if suitable marketing mechanism, varied processing units, adequate storage and cold chain facilities, better linkage between farmers and various stakeholders including industries, ease of doing business, export opportunities and environment for private investment in agri-business improves in the State.

4. Challenges, opportunities and recommendations

4.1 Natural resources management

4.1.1 Water management

Availability of good quality water in adequate quantity for use in agriculture will be highly crucial for attaining food and nutritional security in the future. The State on an average receives about 545 mm of rainfall, of which hardly 30 to 35% is conserved and used for agriculture. There seems vast potential for in-situ and ex-situ rainfall conservation. The State has a total water availability of about 20.93 billion cubic meters which includes the surface water, ground water and treated waste water. The State at present is experiencing water deficiency of about 14 billion cubic meters annually, with the total water demand across all sectors going up to about 34.96 billion cubic meters per year. At present, maximum water use is in agriculture (85.5%) and horticulture (5%). Estimates indicate that by 2047 the availability of water for agriculture is likely to decrease from the present level of 83% to about 65% to 70%. Reuse of waste waters including domestic and industrial effluents, in agriculture will substantially increase (Photo 1). Development of multi- enterprise models for multiple use of water in agriculture including integration of crops, fisheries, dairy, horticulture, mushroom, bee keeping, rain water harvesting for ground water recharge and efficient use of irrigation water is called upon (Photo 2). Integrated water resources plan (IWRP), 2023-25 developed by the State aims at reducing the State's water deficit by 49.7% in two years.

Photo 1- Reuse of waste water

Photo 2- Integrated farming system

It has been reported that during 2022 Kharif season, paddy cultivation in 72000 acres with DSR technique saved 31500 crore litres of water. In Haryana, a farmer opting for DSR gets Rs 4000/acre incentive. There is also a subsidy of Rs. 40,000 for purchase of DSR machine. The target for 2023 is to cover 2 lakhs ha area. The DSR technique is being promoted in 12 districts of Karnal, Kurukshetra, Yamunanagar, Kaithal, Ambala, Panipat, Fatehabad, Sirsa, Hisar, Rohtak, Sonipat and Jind.

4.1.1.1 Water conservation and ground water recharge

- There is need to build reservoirs and ponds & their banks/dykes planted with forest and fruit trees, in foot hill areas of Shivalik for in-situ conservation of rain water (Photo 3).

- Ponds need to be dug out in farmers' fields so that at least one pond of size 0.5 acre to 1 acre represents every 10 to 20 acres of land, for rain water conservation to recharge ground water and for supplementing irrigation water.

Photo 3 – Model for development of Shivalik Hills

- The undulating topography in Shivalik foot hill area of the State triggers soil and water erosion following heavy rainfall showers. The farmers in this area generally grow annual crops with extensive cultivation practices. There is need to introduce perennial fodder, timber and fruit trees, grasses, aromatic and medicinal plants in this area. Pond based intergraded farming system approach will help in in-situ rain water harvesting and recharging of the ground water down the stream.

- Building of mini reservoirs with facility of ground water recharge tubewells and wells along major rivers such as Yamuna, Markanda, Ghaggar and Tangri (Photo 4) will help in storing rain water to control floods down the stream. The stored water can also be used for irrigation during post rainy season. The dykes of all the rivers should be strengthened and planted with soil binding trees and grasses.

Photo 4- Reservoirs alongside the rivers

4.1.1.2 Efficient use of irrigation water

a) There is strong need for extending subsidy for promotion of furrow irrigated raised bed planting (FIRB) in rice-wheat crop rotation areas on the pattern of sprinkler and drip irrigation. In FIRB, wheat, rice and summer moong are planted on ridges and irrigation is applied in furrows. This helps in saving of irrigation water to the tune of 30 to 35 % (Photo 5).

Photo 5- Raised bed planting and furrow irrigation technique

b) The ground water level in the State is declining at an alarming rate due to over extraction to irrigate water guzzler rice crop using flood method of irrigation. For example, in Karnal district, water level declined to the tune of 3.48 meters in last 10 years (2012 to 2022). There is need to develop short duration water efficient crop varieties, replacement of rice areas with low water demanding crops such as cotton, soybean, maize, millets, oilseeds and pulses.

c) Due to deep drilling of water for irrigation, the ground water quality is changing. Installation of a greater number of tubewells in good quality ground water areas and less extraction of water in poor quality ground water areas pose the risk of ground water contamination even in good quality zones. There is strong case to prepare underground water quality map with focus on salinity and heavy metal contamination. To continuously monitor changes in ground water quality on biannual basis, the tube-wells in the vulnerable area need to be marked for sampling to incorporate timely corrective measures. It will be advisable to maintain permanent registers at the village, block and district level mentioning present quality of water and soil, and entries made after every two years. This permanent record of data will help initiating timely interventions to check deterioration in ground water quality.

4.1.1.3 Use of waste water in agriculture

a) Developing technology for safe and judicious use of waste water including industrial effluents in agriculture is need of the hour. Large quantity of sewage water including domestic and industrial effluents is being discharged into fresh water bodies and has become a serious source of soil, water and air pollution. Accumulation of waste water in low lying areas around the cities and in villages is serving as breeding ground for mosquitoes resulting in vector borne diseases. At present, provision exists for reclamation of such water for reuse on a small scale in the State. There is a strong case to dispose of such waters through location specific eco-friendly technologies.

Planning for 2047 will necessitate the need for complete analysis of waste water at the source point and its current use at the site, to develop a base line for action.

b) Planning for separation of domestic waste water from industrial effluents loaded with heavy metals and toxins needs to be strategized. The domestic waste water mainly comprising of human and livestock excreta can be used in agriculture by mixing with fresh water. However, close monitoring of such water on yearly basis will be needed to check nitrate leaching in soil, ground water and edible portion of the crops. Close watch on micro-organisms build-up in general and *E- coli* in particular has to be exercised.

c) In cases where domestic sewerage and industrial effluents are draining at one point, such water should not be used to irrigate edible crops. A part of such sewerage effluent can be used for raising green belts using high transpiration trees such as eucalyptus, dalbergia, bamboo, pongamia, casuarinas, silver oak etc. In this case, trees are raised on bunds of about one meter height and one meter width. The sewerage effluents are disposed in the furrows between tree rows**.** It may also be useful for rehabilitation of unused waste land areas in periphery of big cities and also along roads, railway tracks and canals. However, careful monitoring of soil, ground water and air pollution will be required to incorporate timely corrections. In this case, the waste water which has no issue of heavy metals and other toxic actions and anions should be targeted.

d) The most effective and practical way to deal with waste water is to establish waste water treatment plants. Keeping in view the present availability of sewerage water in major cities and towns of Haryana and likely availability of such water by 2047, a road map for its treatment for domestic, industrial and agriculture use is called upon**.**

4.1.2 Soil management

Soil is a medium for plant growth and it supplies all the major and micro nutrients essential for healthy growth of plants. The soil organic matter content is an indicator of good soil health. Unbalanced use of fertilizers and over exploitation of soil for cereal crops production (rice-wheat) for more than four decades has deteriorated the soil quality in terms of depletion of organic carbon levels, emerging deficiencies of primary, secondary and tertiary nutrients, increased ratio of N:P:K and leaching of nitrates into the ground water. More than 50% of soils are deficient in N, about 30% in P and K, and nearly 20% in S and micronutrients. Maintaining of proper soil health for future food, nutritional and environmental security, will be called upon.

4.1.2.1 Reclamation of water logged and salt affected soils

- At present about 9 percent area of Haryana is affected with water logging and salinity. Soil salinity and alkalinity is reportedly increasing at the rate of 7-8 percent and 1-2 percent per annum, respectively.
- Quality of gypsum being currently used in the State imported from Rajasthan used in reclamation of alkali soils is not of desired quality. There is need to explore

alternatives to gypsum such as use of industrial by-products and finding new niche areas having better quality gypsum deposits such as in Jammu and Kashmir. In light of increased price of gypsum over the years, subsidy on gypsum need to be continued till all alkali land is reclaimed in the State.

- The CCSHAU need to prepare a fresh soil quality/fertility map of the State to revise fertilizer recommendations including micronutrients and other trace elements. This will help in preparing upgraded soil health cards containing information about micronutrients and heavy metal status of soils.
- Need to develop crop varieties having efficient nutrient mining and uptake systems so that they give same yield with 30% less fertilizer application.
- Conversion of bio waste including domestic sewage and industrial waste into organic manures and as nutrient source needs to be encouraged.
- Develop strategies that will halt soil erosion and soil degradation due to chemical and physical processes.
- Fixing bench marks in all districts of the State to monitor build-up of heavy metals in the soil and devising timely preventive and management strategies.
- Adopting integrated nutrient management strategy with major emphasis on organic manures, biofertilizers, biological N fixation and recycling of farm waste to increase availability of manure to promote organic and natural farming.
- There is need to accelerate research on industrial by-products for their use as biofertilizer, biopesticide, amendment source, growth promoters and soil rejuvenation source. For example, rice husk has abundant silica and can be explored as physical barrier against pests and also to increase water holding capacity of the soil.
- Sustainable management of sand mined areas with major emphasis on stabilizing 20 feet dyke areas with soil binding trees and grasses. The sand mined areas in the State are a major source for soil erosion and silting of water courses during floods (Photo 6). There is need to revisit sand mining policy of the State.

Photo 6 – A view of sand mining area near Karnal

- Intensification of nanotechnology and sensor-based research to increase use efficiency of nutrients and water.

4.1.3 Climate

Photo 7 – Flood water damage to crops during 2023

Climate change has become almost a reality. Shift in rainfall, temperature, relative humidity, pests and diseases & altitudinal limits of crops has been observed in different agro-eco regions of Haryana. The recent example is of devastating floods the State has experienced during 2023**.** In large area adjoining Yamuna, Ghaggar, Markanda and Tangri rivers which pass through the State, rice, maize, fodder and vegetable crops were extensively damaged (Photo 7). During Rabi 2022-23, heat wave lowered the productivity of wheat significantly in the State. The same region is experiencing exposure of crops during growth to different stresses like drought, submergence, salinity, heat wave, cold wave and frost, flood, land slide, cloud burst, lightning and storm, heavy rain and cyclone etc. An Annual Report by Centre for Science and Environment (CSE) recently reported that 89 percent of days saw extreme weather events between January 1 and October 31, 2022. Further analysis of the data by CSE revealed that these extreme weather events claimed the lives of 2952 people and impacted 1.81 million hectares of crop area in the country. Developing of crops, commodities, enterprises and cropping systems keeping in view single stress management approach is unlikely to yield desired results. Development of multi-stress tolerant crop varieties is the need of the hour. The following approaches may be adopted: -

- Establishment of bench marking studies at all the research centers in the State to understand weekly, monthly and yearly behavior of moisture, temperature, pests/ diseases/weeds, relative humidity and sun shine hours and correlating it with phenophases of the crops grown in the region/area. Based upon this information, crop weather relationships need to be worked out to make future predictions. Screening of germplasm for traits linked with abiotic stresses and development of multi-stress tolerant crops and varieties using gene pyramiding approach either by Marker Assisted Selection (MAS) or by transgenics.
- Conversion of C3 plants to C4 mechanism of photosynthesis to take advantage of increasing CO, levels likely to be available in the atmosphere as a result of increased greenhouse gas emissions from agriculture systems.
- Development of multi-enterprise agriculture systems to cover risk of crop failure, to increase carbon sequestration/carbon trading and to ensure multiple use of resources by integrating livestock, fisheries, horticulture, mushroom and bee keeping etc. This will be climate resilient system which will have the potential to double farmers' income even during climate change scenario uncertainties.

- Establishment of crop weather watch group in the department of Agriculture and Farmers Welfare at Panchkula on the pattern of crop weather watch group of Union Ministry of Agriculture and Farmers Welfare. This group needs to meet every week on a specified day to prepare an advisory for release in media and press for benefit of the farmers. Similar crop weather watch group needs to be established at the district level in the State.

- Establishment of a committee at the State level to study the district wise impact of climate change on agriculture and behavior of microclimates within the districts and blocks. Based upon data analysis, the committee should suggest anticipatory and forewarning measures to deal with climate change impact on agriculture in the near future. There is need to establish automatic weather stations at block and cluster of villages level (Photo 8).

Photo 8- A view of Automatic Weather Station

4.1.4 Biodiversity

Biodiversity of plants, animals and microbes is very crucial to maintain their habitat and ecosystem in good condition. The climate change is likely to seriously impact the biodiversity. The water resources and courses may change, environment may become favourable for some existing or new species and unfavorable for other ones, new pests may appear or food chain may break. The well-being and survival of species in an ecosystem are so closely interlinked and climate change impacts on biodiversity are so complex that it is often difficult to predict its effect on individual species. Land use changes and over-exploitation of certain species for economic gains have also become a major threat to biodiversity. A large number of species that are useful for us have become threatened and endangered. But we cannot afford to lose other species just because their economic importance has not yet been found. An intensive and deeper understanding of baseline information on biodiversity trends and threats is urgently required in the State and we need to develop strategies for their management. For conservation of biodiversity, both *in-situ* and *ex-situ* approaches may need to be employed as per the suitability.

- The Government of Haryana needs to strengthen existing Biodiversity Authority for sustainable conservation and use of biodiversity wealth of the State.

- Monitoring of present status of biodiversity of plants, animals and microbes in the State is needed. A bench mark data is needed for prevention of biodiversity in the future.

4.1.5 Environment

- Release of toxic and poisonous gasses and effluents from the industries has become a major concern for environmental pollution. The toxic effluents are released into rivers, water courses, drains, ponds and low-lying areas in the State. Reports of contamination of ground water with industrial effluents are pouring from different parts of the State. During an interaction meeting with farmers at Gurugram, the farmers reported very high concentration of toxins in water of canal and drains which pass through the area. They shared that the water is not fit for drinking and irrigation. This calls for eco-friendly management of waste water released from the factories.
- The Punjab Pollution Control Board (PPCB) in the recent past has detected ammonia and chlorine in the environment around factories of National Fertilizer Limited (NFL) as well as Punjab Alkalis and Chemicals Limited (PACL) and consequent problem of breathing in students of nearby school. Incidences of gas leakage from factories are also reported in the past including Bhopal gas tragedy. This calls for a policy initiative wherein the State may ask all factory owners in the State to get audits of safety norms done periodically.
- Discharge of large quantity of untreated domestic and industrial effluents has become the main reason behind toxic water of Yamuna and Ghaggar rivers flowing through the State. It is reported that 11 drains are discharging 540 million liters per day (MLD) untreated effluent into Yamuna. It is further reported that of the 80 locations in the Yamuna catchment area where ground water quality is being monitored by the State Pollution Control Board, water at 14 locations, including 6 in Palwal, 5 in Ballabhgarh, 2 in Bahadurgarh and one in Nuh district was not found fit for drinking. There are 59 sewage treatment plants (STPs) in Yamuna catchment and 25 in Ghaggar catchment areas. Of these, 25 STPs in Yamuna catchment and 23 in Ghaggar catchment areas are reported non-compliant STPs.
- Reports indicate that 150000 tonnes of solid waste is generated in India every day. More than 50 percent of it is untreated, gets land disposed and/or not collected at all, and is a major concern for environmental pollution. Similarly, large quantity of solid waste is generated in the State and remains untreated.
- In a most recent report (The Tribune, 10 August, 2023), the Haryana State Pollution Control Board (HSPCB) has found that leachate being discharged from the Bandhwari landfill into the surrounding Aravalli is highly toxic. The samples tested indicated that BOD and COD were over six times higher than the prescribed limits.

4.1.6 Organic and natural farming

Chemical inputs-based agriculture in last four decades has resulted in contamination and pollution of soil and water resources, recycling of heavy metals and toxins in soil-water-atmosphere-animal-human chain, development of resistance in pests & weeds and

emergence of new diseases. There is need to reverse the damage already caused to our natural resources due to excessive use of chemicals in agriculture food system in the past and to tune agricultural production practices in harmony with nature. Promotion of organic and natural farming in the State seems an option of great promise to make agriculture sustainable and eco-friendly particularly in south-west region. The State has planned to cover 23000 ha area under natural farming during 2023. The following strategies are suggested to promote organic and natural farming: -

- Large number of farmers in the State have started organic and natural farming. In the interaction meetings, almost all farmers reported difficulty in marketing of their produce.
- In recent report, the European Union (EU) has found many weaknesses in the certification of Indian organic products for exports to the EU. This includes farmers who are part of organic producer groups (PGs) knowing little about organic farming and weaknesses in the supervision and implementation of the controls at various levels. The EU further found severe infringements of the National Programme on Organic Production (NPOP) by several participating groups.
- Booths for sale of organic produce on the pattern of Vita booths need to be established or a tie-up mechanism of organic producers with Vita, Harhith stores may be explored to facilitate sale of organic produce at the remunerative price.
- Establishment of a quality testing lab for organic/natural farm produce at district level to facilitate certification of the produce.
- Declaration of separate MSP for organic/ natural farm produce.
- A cool chain facility in the vicinity of main vegetable/ fruit markets should be created so that farmers skip distress sale and alternatively keep their produce in the cold stores.
- Separate space for organic produce in the Mandies.
- Establishment of booths for sale of organic/natural produce at all bus stands in the State.

4.1.7 Forestry and agroforestry

There is an urgent need to increase forest area in the State which is dwindling at 1.5 to 3.0 percent. The State needs to have about 33 percent area under forest cover to maintain ecological and environment stability. The scope to shift area from food crops to forestry is limited. Following recommendations are made to increase forest cover in the State from 3 percent to about 20% by 2047: -

Photo 9- Poplar based agroforestry

- Need to promote forestry and agroforestry in a big way in districts adjoining Shivalik foot hills. Poplar based agroforestry is a time-tested intervention in Yamunanagar, Karnal, Ambala, Kurukshetra, Panchkula and linked with plywood manufacturing industry (Photo 9). A sizeable area was covered under this agroforestry system in 1990s and farmers were very happy, but wide fluctuations in prices of poplar discouraged farmers to continue with this best management eco-friendly farming practice. Such time-tested agroforestry practices needs to be promoted in a vigorous way. Integrating trees with agricultural crops is the only way to increase forest cover in the State and help sequestering greenhouse gasses to make agriculture climate resilient. Horticulture based agroforestry/silvipasture also needs to be promoted in Shivalik foot hill areas with incentives. Kinnow-bhabar grass is one example acceptable to the farmers. This one intervention will help rain water conservation in-situ, check soil erosion and help recharging ground water down the stream. The farmers of the area may be compensated for initial three years for bringing change in their mindset to shift a part of their land from annual crops to perennial horticulture, high value medicinal, aromatic, herb and shrub crops. This can be promoted in the form of a pond based integrated farming system with major component of horticulture, livestock, mainly small ruminants, fisheries, mushroom, bee keeping enterprises etc.
- The recently introduced Forest Conservation Amendment Bill 2023 is reported likely to expose 50000 acres of the Aravalli to commercialization. Nearly 10000 acres of Aravalli in Gurugram and Nuh are already vulnerable and can be soon lost. The policy should be to conserve and not consume. The desertification and land Degradation Atlas 2021, released by Indian Space Research Organization (ISRO) showed that 8.2 percent (3.6 lakh ha) of the State's total land area has degraded. This area has ample scope to be covered under trees and tree-based systems.
- Extension of fruit and high value timber plantations on all waste and degraded lands currently lying unutilized in the State. The Aravali hills in the south of the State offer good scope for increasing green cover of the State. A sizeable area in Mewat and adjoining districts is salt-affected which can be covered with salt tolerant trees, grasses and shrubs identified promising by CSSRI, Karnal. *Prosopis juliflora* based business model needs to be developed for promotion of bio saline agroforestry to generate biomass for electricity generation and as an alternate feed and food resource (Photo 10).
- Several areas in the south west districts are waterlogged and affected by soil salinity/ alkalinity. The water table in these areas either remains on the surface or within 2 meters depth from the surface during most part of the year. The farmers generally leave such areas fallow as growing crops is neither feasible nor economical. There is strong case to promote bio drainage technology to lower the water table and make economic use of such abandoned lands. In this case, high transpiration trees like Eucalyptus are integrated with crops as block plantation on Kila lines and/or integrated

with crops as a united agroforestry system**.** Bio drainage is a time-tested technology to check seepage from water courses and also to keep water table beyond the root zone in areas showing rising water table trends.

- There is acute shortage of water in south-west districts of Haryana. The highest priority in this region needs to be given to rainwater harvesting- both in-situ and ex-situ, storage and reuse of water to provide lifesaving irrigation to crops. The best option would be to go for digging ponds in all area lying fallow and unused at present. The dykes in all dug-out ponds should be planted with arid fruits like amla, ber, guava, fig, phalsa, edible cactus, karaunda, datepalm, pomegranate, shrubs of medicinal & aromatic high value crops, and timber & fodder trees like genus Prosopis, Hardwickia, Ailanthus, Neem, Dalbergia, Acacia, Mehndi etc. There is also a need to standardize bio fencing technology to protect the crops from wild animals like blue bulls. All land along the rivers, canals, roads, drains and railway tracks offers good opportunity to go for large scale tree plantations to increase forest area in the State.

Photo 10- Prosopis based business model in Saline areas

4.1.8 Benchmarking and periodic monitoring of production resources

Over exploitation of soil and water resources and excessive unscientific use of agrochemicals to produce sufficient food for the burgeoning population in the recent past has resulted in deterioration in soil & water quality and harmful effects on human & animal health as well as environment. Recent examples are of endosulfan use in Kerala and its effect on human beings, and higher concentration of arsenic and other metals in ground water of south western region of Punjab and Haryana resulting in several cases of health hazards including cancer in the region (Photo 11). There is a strong need to establish bench mark studies in all regions of the State to monitor changes in soil and water quality as a result of application of agrochemicals and likely chances of entry of harmful toxins in animal-human and environment chain. This kind of effort will help taking necessary preventive and control measures timely. The priority research area in this section may include: -

- Monitoring changes in soil and ground water quality as a result of continuous use of agro-chemicals in all districts of the State.
- Multi-disciplinary team research involving agronomists, soil scientists, hydrologists, medical and veterinary scientists, nutrition experts etc. in farmers' participatory mode to address location specific problems.

- Monitoring changes in ground water quality as a result of deep drilling/ extracting water from 300-400 feet deep aquifers for irrigation and drinking purpose.

  Ground water recharge and ground water quality variations in good-quality and poor-quality ground water areas in the State.

Photo 11-Impact on human and animal health of heavy metals like Arsenic, Fluoride and Selenium in soil and water

4.2 Crop improvement and management

4.2.1 Crop specific research and development priorities

Wheat and Rice

The CCSHAU needs to focus only on developing: -

- Extra short duration varieties of rice with seed-to-seed total duration of 120 to 130 days.
- Only water efficient, short duration varieties of wheat without compromising on yield and quality.
- Fortified varieties of cereals mainly rice and wheat to address hidden hunger problem.
- Technologies for conversion of existing C_3 photosynthesis mechanism into C_4 mechanism in rice and wheat to trap higher Co_2 concentration for higher biomass production. Need to develop plants to trap higher amount of photosynthetically active radiation.
- Farmer friendly paddy transplanter to suit small land holding size.
- Weed management strategy in direct seeded rice and zero tilled wheat.
- Upgradation of DSR technology to make it farmer friendly.
- Stem borer resistant varieties in rice.

Pulses

The focus of research should be on: -

- Development of Tur, Urad, Moong, Gram and lentil varieties and hybrids with yield advantage of 25-30% over the present stock.
- Using biotechnology and genetic engineering tools to incorporate resistance for pod borer and yellow vein mosaic in pulses.

- Exploiting potential of hardy minor pulses such as moth bean and lathyrus with low ODAP.
- Development of short duration pulse varieties, particularly moong and mash with uniform ripening character.
- Development of short duration, high yielding, water logging tolerant pigeon pea and chickpea varieties for south-west Haryana region.
- Development of farmer friendly machinery for simultaneous harvesting and thrashing of pulse crops.
- Cold wave/frost tolerant pulses like pigeon pea, moong and urad.
- Herbicide tolerance and integrated weed management technology.

Cotton

- CCSHAU, Hissar needs to strengthen their research on Desi cotton to develop high yielding pest and water logging resistant varieties.
- Development of Bt cotton varieties in the public sector with yield advantage of 25%-30%. The yield advantage with introduction of Bt cotton in the country is mainly through better pest management (boll worm) and not through the enhancement of genetic potential. Several cotton growing countries like Brazil, USA and Argentina are getting almost 2-3 times more productivity compared to average cotton yields in India.
- Development of Bt cotton material having tolerance to water logging and salinity in the State.
- Establishing proper surveillance and monitoring systems to maintain long term sustainability of Bt cotton.
- Major source of white fly/pink boll worm survival and infestation is import of Binola by traders from south and left over cotton sticks stacked in the farmers' field after last year's harvest. The following policy interventions are suggested: -

  a) Strict ban on import of Binola from southern States to Haryana.

  b) Removal of all cotton sticks stacked in the village boundary at Panchayat level using MGNREGA labour and its sale to Energy Generation Company.
- Introduction/development of cotton-picking machine to suit cotton varieties grown in the State.
- State government need to develop a special scheme for cotton growing area to provide pheromone traps for control of white fly.

Sugarcane and Sugar beet

- In case of sugarcane, there is strong need to develop seed nurseries of promising high yielding varieties using tissue culture and single bud multiplication techniques.

- There is also a need to develop early maturing sugarcane varieties.
- The recommendations of central variety release committee need to be implemented in the State and there should be no obligation to cultivate only State level released varieties.
- Sugarcane has ample scope for ethanol production and hence needs promotion on cluster mode in sugarcane growing areas.
- Need to develop short duration varieties with higher sugar recovery, tolerance to water logging and salinity & resistance for red rot disease.
- Refinement in sugarcane-pulse intercropping planting and harvesting technology.
- Exploiting sugar beet as an alternate sugar and fodder crop in marginal areas including salinity affected regions.
- Developing sugarcane, sorghum and sugar beet varieties especially for ethanol and energy production.
- Developing farmer friendly sugarcane harvester.
- Timely start of sugarcane crushing by sugar mills in the State.

Oilseed Crops

There is need to focus on: -

- Development of boll worm and water logging tolerant soybean varieties.
- Seed viability research in soybean.
- Development of multi stress tolerant high yielding sunflower and caster hybrids.
- Exploring vegetative propagation technique (Tissue culture) in groundnut.
- Development of micro-seeds production in groundnut like micro-tubers in potato.
- Development of high yielding pest resistant varieties in sunflower and mustard.

4.2.2 Horticulture

- Need for effective policy for certification of nursery of fruit trees in general and screening for nematode infestation.
- Subsidy for establishing mixed orchards should also be allowed.
- At present there is no MSP for vegetables, fruits and flowers due to which several farmers are leaving cultivation of horticultural crops. The organized market for flowers in Haryana is missing.
- The subsidy for promotion of protected cultivation has been reduced. It needs to be raised to previous level. There should be no limit for land unit for subsidy. Even half acre farmer should be eligible to take advantage of subsidy on government schemes.

- At present heat stress compensation includes only vegetables; fruits and flowers should also be included.
- The hybrid vegetable seeds of private companies are very costly. CCSHAU needs to standardize/ upgrade their seed production system to compete with private companies or collaborate with such companies for large scale seed production at each of their KVKs as farmer participatory seed production venture.
- Establishment of centres of excellence and certified nurseries of horticultural crops in the State.

4.2.3 Crop diversification

Rice-wheat crop rotation covers more than 80% area in the States of Punjab, Haryana and western U.P. This area is not ecologically suitable for rice cultivation. However, this water loving crop was introduced in a big way in late sixties to achieve food security of the country. Continuous cultivation of rice for nearly 50 years in northern India region helped the country for making it food deficit to food surplus nation. However, it resulted in draw down of ground water, multiple nutrient deficiencies in the soil, increased emissions of greenhouse gases contributing to climate change and environmental degradation. In the recent past, large scale burning of rice residues after harvest raised the issue of air quality and consequent impact on human and animal health. There seems no other option but to reduce area under rice cultivation in Haryana and to shift to other low water requiring alternate crops. The promising crops which have the potential to replace rice in the State are: maize, soybean, cotton, pulses, oilseeds and vegetables (Photo 12).

Photo 12- Crop diversification options for Rice-Wheat cropping sequence

Past efforts by Punjab and Haryana governments to replace some area from rice to above mentioned crops did not yield the desired results. The Task Force makes following recommendations to make diversification happen in Haryana: -

- There is strong need to develop diversification plan keeping in view cluster of villages/ block/district concept instead of one blanket plan for the whole State. This plan should be prepared area wise keeping in view potential of alternate crop/s which can replace rice and give almost same returns to the farmer as he receives from rice cultivation.
- Involvement of private sector in a big way to create infrastructure in cluster of villages/blocks/districts for procurement, storage, processing, value addition, marketing and trade of the diversified crop/ crops in the targeted area. This will help in building farmers' confidence to adopt diversification. The MSP of the diversified crops needs to be fixed in such a way that farmer gets same returns or even higher what he gets from water guzzling rice crop. The State government need to provide congenial environment and incentives to the private sector to enter into State's crop diversification plan in a big way.
- The State government has planned to cover 3.14 lakhs acres under crop diversification by 2025 which is projected to save 1.05 lakh crore litres (7.6%) of water, direct seeding of paddy to cover 4.75 lakhs acres with a target to save 1.18 lakh crore liters (8.4%), while 27.53 lakhs acres is planned to be covered under conservation tillage to save 0.51 lakh crore liters (3.7%). These are good initiatives and need further strengthening.
- One of the main reasons for slow pace of crop diversification is lack of proper marketing in the State. During 2022-23 cropping season, maize, sunflower and mustard growers in Haryana suffered huge losses as they had to sell their produce to private buyers at 20 to 50 percent below the minimum sport price (MSP). For example, maize crop was sold by the farmers at Rs. 900 to Rs. 1400 a quintal against the MSP of Rs. 1962. Assured MSP for crops such as cotton, maize, soybean, canola, mustard, oilseeds, millets and pulses will help in crop diversification in the State.
- The past experience testifies that the price of the diversified crop crashes to below MSP and farmers have to dispose of their produce at a through away price. Poplar based agroforestry was adopted by the farmers in a big way in Yamunanagar, Karnal, Ambala and Kurukshetra districts of the State between 1990 to 2000. However, this eco-friendly practice did not sustain due to crash in prices of poplar wood in the market. Similar was the case with oilseed sunflower crop. Sizeable area in Kurukshetra and adjoining districts came under sunflower during nineties, however, this diversification effort also failed due to marketing problem and spurious seeds. These experiences and lessons learnt from past need to be kept in mind while making future crop diversification plan of the State.

4.2.4 Crop residue management

It is reported that nearly 23 million tonnes of crop residue is burnt in Haryana, Punjab and UP every year. Stubble burning is an important source of greenhouse gas emissions (GHG) and aerosols. The practice of burning stubble in the field is reported to release 70% CO_2, 0.66% methane and 2.09% nitrous oxide. Burning of crop residues also leads to loss of organic matter, plant nutrients and beneficial microbes from the soil. The State need to be totally

free from crop residue burning problem. The State government made very successful efforts in the recent past which resulted in significant reduction in crop residue burning incidences.

- For ex-situ management of paddy straw, about 25 private markets are in operation in the State. Subsidy provision of Rs.7000/acre to replace rice with maize and Rs.4000/ acre for direct seeding of rice has been made by the government. All machinery needed for efficient management of crop residues is being provided on a highly subsidized rate to individual and group of farmers. These initiatives need further strengthening.
- Special emphasis is needed for in-situ management of crop residues like rice and wheat stubbles to stop burning and resultant pollution of air. One of the practical options is to use rice residue as mulch instead of plastic mulch currently used. To promote use of crop residues for mulching, provision of subsidy on the same pattern as given on plastic sheets need to be extended for use of paddy biomass as mulch.
- There is acute shortage of dry fodder in the State and adjoining States of Rajasthan and Gujarat. Possibility needs to be explored to create fodder banks in drought prone areas by using paddy straw. The adjoining Rajasthan State may be interested in buying paddy stubbles from Haryana. The State government need to develop tie-up mechanism for sale of excess paddy straw to Rajasthan.
- About 83 percent farmers in the State cultivate less than 5 acres of land and about 50 percent of total farmers cultivate less than just 2.5 acres These farmers hardly cultivate 2 to 3 acres under paddy, generally grow basmati and use the straw for feeding to the cattle. These farmers do not need costly heavy machinery being provided on highly subsidized rates. A separate subsidy scheme needs to be drafted for crop residue management for small farmers in the State. This scheme should focus on in-situ management of crop residue for fodder and soil mulch use.

4.2.5 Fodder and feed resources

Area under fodder crops is almost constant for the last 2-3 decades. There seems little scope for increasing area under fodder crops because of committed requirement for growing cereals, pulses and oilseed crops. Increasing productivity per unit area of cultivated fodder crops, improving productivity of rangelands/grasslands, fodder cultivation in waste lands, value addition in naturally growing top feed trees and bushes, conversion of crop residues into palatable dry fodder/feed through fortification with molasses, urea etc. are some of the options to increase fodder and feed availability for animals. The research efforts need to be focused in following areas: -

- Development of dual purpose (fodder + grain) crop varieties in wheat, barley, oats and multi-cut fodder grasses.
- Identification, improvement and value addition in top feed and fodder trees & bushes like genus *Prosopis* and *Opuntia* (Cactus) growing naturally in waste and abandoned lands (Photo 13).

- Cactus has highest WUE per unit dry matter production
- Good option for promotion in dry/rainfed area
- Used as fruit, fodder, vegetable and medicinal plant
- Excellent bio-fence plant
- Bioenergy source
- Medicinal use

Photo 13- Edible cactus-based development model for Aravali Hills re-vegetation

- Development of drought tolerant agroforestry/silvipastoral models for vegetation/ rejuvenation of rangelands/grasslands/wastelands.
- Technology for conversion of all crop residues, horticultural wastes and damaged grains into valuable fodder and feed resource.
- Bio fencing models around agricultural fields with major emphasis on top feed trees and bushes for augmenting food and fodder availability, guard against wild animals and soil & water conservation option in dry areas of the State.
- Development of cattle and small ruminant animal breeds efficient in water, fodder and feed utilization efficiency.
- Development of farmer friendly bailers, pelleting machines etc. to cut and store fodder when available in plenty.
- Increasing availability of fodder grass seeds.
- Need to establish silage/ hay making plants in all districts of the State.
- Creation of fodder banks using crop residues in general and rice residue in particular.

4.2.6 Input management

- There is shortage of fertilizers and other inputs during sowing of rice, wheat and other crops. Many times, fertilizers like DAP, MOP, NPK etc. are made available only when the crop is already sown. Similar is the case with availability of urea during the crop growing season. Non-availability of inputs in right quantity at the right time affects production and productivity. The State government may start planning early in consultation with central government so that the fertilizers are made available to the farmers at least one month in advance of sowing of the crop.
- It has been reported that about 52,466 metric tonnes of chemical pesticides were used in agriculture across the country in 2022-23. At present nearly 300 pesticides and their 792 formulations of different types are registered in India. The total use of pesticides in Haryana during 2022-23 was 4066 tonnes with per hectare consumption of 620 grams (2016-17 figures). Several studies in the past reported that pesticide poisoning is rising sharply. There is a need to provide compensation to the farmers and agriculture labourers in case of death and disabilities due to pesticides poisoning.
- Sale of spurious inputs is one of the main concerns of worry with the farmers. In spite of good intentions at the government level, the trade of spurious pesticides, weedicides, seed and fertilizers is flourishing. SOPs need to be put in place for implementation of Pesticides, Seed and Fertilizer Acts to punish offenders. The State may also consider some additional measures to check the business of spurious inputs, including establishing an independent authority to deal with spurious agro-chemicals.

4.2.7 Management of wild animals

During all the interaction meetings the farmers reported a serious problem of wild animals. The wild animals like blue bulls cause extensive damage to crops like maize, pulses, fruits, vegetables and fodders. A special scheme needs to be formulated to help the farmers for establishment of bio fence involving trees of the genus Prosopis, thorny cactus, karonda, mehndi, bamboo etc., and a combination of bio and barbed wire fencing.

4.3 Livestock

- Livestock contributes about 18% of total greenhouse gasses emissions. There is need to improve microbial rumen digestion efficiency.
- There is need to develop recombinant vaccines with advantage of better immunity and long self-life. There is also need to develop proper cool chain for emergent delivery of vaccines at the door step of farmers. Policy needs to cover past data about the use of vaccines and occurrence of diseases. Ph.D and M.Sc. students need to be involved in survey, data collection and analysis.
- On the pattern of developed countries which have special Livestock Boards to deal with all livestock related issues, the State Government may strengthen the Livestock Board already existing in terms of manpower and funds, with autonomy in functioning.

- More than 62% Below Poverty Line (BPL) families, most of them landless labourers, rear goat and sheep for their livelihood. Use of artificial insemination in sheep and goat is need of the hour to improve production and productivity.
- Establishment of state level disease surveillance and forewarning mechanism to ensure timely preventive actions to avoid outbreaks of animal diseases.
- There is strong need to develop scientific systems to manage animal waste including proper disposal system for carcasses as alternate to present Hadda Rori system.
- Production of Bio-CNG, electricity, compost and other value-added products from animal waste need to get high priority.
- Year-round feed and fodder production plan using village panchayat lands and other unutilized waste lands should be developed, as the State is suffering from acute shortage of both green and dry fodders. This plan should include feed and fodder production strategy of reasonable nutrition quality to cover all animals in the Gaushalas in the State. Huge amount of cow dung is generated in each Gaushala which can be composted using modern technology and sold to the farmers/other stakeholders to promote organic and natural farming. Large quantity of vermicompost produced and sold may be a permanent source of revenue for the Gaushalas.
- LUVAS has taken a good initiative of mobile van for at spot milk processing. This can be very successful for increasing income of small farmers and land less labourers engaged in dairy farming. This initiative needs to be further upscaled at the State level. Recently, the State government has sanctioned 100 such mobile vans.
- Need to develop livestock portal on the pattern of developed countries where information about each animal regarding milk production, disease diagnosis (health condition) treatment strategy etc. can be uploaded.
- There is no well-established extension mechanism in the field of animal husbandry. Establishment of animal husbandry extension service to the farmers on the pattern of agricultural extension is need of the hour.
- There is strong need to establish animal hostel at village/cluster of villages level to deal with the menace of stray cattle. Similarly, state-of-the-art cattle mobile hospital plan can be formulated by the animal husbandry department of the State. It is very difficult to transport a sick animal to the veterinary hospital. The hospital service should be provided at the door step of the farmers. By 2047, the whole State needs to be covered by mobile hospital service.
- The buffalo population is declining in Haryana. There is need to increase semen availability of elite bulls. Embryo transfer technology has ample scope to develop elite animals. There is also need for genomic based elite animal selection.
- Efficiency of AI for conception has declined over the time. Farmers revealed that the animals have to be inseminated 2 to 3 times to get positive results. There is a

need to develop pregnancy diagnosis kit for use by the farmers. Artificial insemination also needs to be promoted in goat and sheep.

- Haryana is bestowed with the best quality Murrah buffaloes in the world. Many countries have started importing Murrah bulls and females to increase milk productivity in their respective countries. There is strong need to prepare village based genetic and production inventory of all elite bulls and buffaloes in the State in general and Jind, Rohtak, Hissar and Jhajjar districts in particular. At least two elite buffalo bulls and two cattle bulls should be maintained in each village. A separate portal may also be developed for listing all breeds of buffaloes in general and Murrah & Nili Ravi in particular.
- Dairy owners, dairy development societies and farmers reported prevalence of artificial milk. There is a strong need to curb the supply of artificial milk in the State by the enactment of law. Production of artificial milk is a major source of crash in prices of genuine animal milk produced by small and marginal farmers and dairy owners.
- Goat, sheep and pig farming needs to be promoted amongst landless labourers, small and marginal farmers.

4.4 Fisheries

- In the recent past, fish farming has picked up in the State due to implementation of Pradhan Mantra Matasya Samparda Yojna. Under this scheme, 40% subsidy for shrimp farming to general category and 60% to SC and ST category farmers is provided. Farmers are earning Rs. 4-5 lakhs/ acre from this activity.
- There is great scope of expending area under saline aquaculture shrimp farming. During 2022, shrimp was cultivated on 1250 acres and other fish on 2942 acres.
- There is a need to identify suitable areas, establishment of soil and water testing laboratories and cold storage, and processing facility to make this activity sustainable and credit worthy. State Fish Farmers Development Authority (SFDA) has introduced fish farming in village ponds under the supervision of village Panchayats to increase Panchayats income.

4.5 Renewable Energy

- Energy is likely to become a limiting factor for agriculture in near future. Major emphasis will be required to generate solar, water, wind and biomass based renewable energy. The State government has made significant investment is promoting use of solar energy at the grass root level by providing incentives and subsidies to the farmers. It is possible to light all the cities of Haryana by solar energy by 2047. On the pattern of solar energy promotion, the State need to make more investment in promotion of water and wind-based energy where ever feasible.
- Lot of cow dung is produced daily in Gaushalas in the State. This cow dung can be effectively converted into Bio CNG gas by establishing bio gas generation plant in

each of the Gaushalas. The bi-product of the plant in the form of slurry and solid compost will contribute markedly in promoting organic agriculture and natural farming.

- Cultivation of short duration stress tolerant energy crops in wastelands and conversion of residues/bi-products of agriculture into energy need exploitation on a pilot scale. Large number of woody species including shrubs are naturally growing and coppicing every year in waste and abandoned lands which can be properly harvested and gasified to produce energy. There is a need to standardize technology for village and group of villages level implementation to produce energy from village waste and biomass.
- Survey data reveals that about 41 percent households in rural Haryana are still relying on firewood, chips and crop residue for cooking, while 3.7 percent use dung cakes. About 54 percent households in rural areas of State are using LPG. However, in urban areas, the LPG usage is 94 percent. There is need to establish community-based bio-gas plants in villages.
- Energy can also be generated using damaged food grains, sugarcane, maize and other grain crops, if spare grains are available after meeting food requirement of the State/ country.

4.6 Holistic village development plan

Sons/ daughters of farmers are not interested to continue in the profession of agriculture, their forefathers followed by centuries. Most of rural youth want to shift to cities and abroad for seeking green pastures. There is strong need to provide civic amenities in villages at par with cities to retain youth in agriculture. The following suggestions are made: -

- Establishment of nutritional garden, recreation and physical exercise facility in villages as available in the parks in the cities.
- Establishment of village pond/ ponds having capacity to store all excess rainfall which falls in the boundary of the village. The dykes of these ponds to be planted with fruit, timber, herbal and other high value crops. These ponds will also serve promotion of fisheries in the State.
- Planting of perennial fodder trees, shrubs and grasses of high-quality fodder in the Panchayat and Shamlat land. The additional year-round fodder production in the unutilized Panchayat lands will help small, marginal and landless labourers rearing livestock including small ruminants to augment their fodder requirement. The surplus green fodder available in the village can also be supplied to nearby Gaushalas.
- Installation of Panchayat level solar power plant/plants to provide drinking water, street light, to run drip irrigation system for recreation, nutrition and herbal garden etc.
- Implementation of ‘one village one sport’ concept.
- Separate gymnasium facility for men and women.

- Establishment of physical and/ or e-library facility and internet connection.
- Medical health card of all residents in the village.

4.7 Agriculture mechanization

- There is need to develop and standardize machinery to suit small farmers.
- The farmers reported that the cost of machines provided on subsidy is much higher than the actual cost of those machines in the market. Adequate safeguards should be kept in the scheme so that the farmers are able to purchase subsidized machine from any dealer out of the list prepared by the State government at the most competitive rates.
- Laser leveler is a very productive machine for saving irrigation water to the extent of 6 to 10 percent. Subsidy on this machine should be re-started and continued.
- SMS attachment to combine needs restoration as it is better option for paddy straw management.
- Development of cotton-picking machine to suit varieties grown in the State is need of the hour.

4.8 Skill and entrepreneurship development

- Establishment of State Research Fund on the pattern of National Research Fund to promote excellence in science in general and agricultural sciences in particular. This fund may be used for upgrading skills and capabilities of State's scientists through their short and long-term trainings at centres of excellence in India and abroad. This fund can also be used to build centres of excellence around result oriented innovated scientists, entrepreneurs and farmers. Special quota for farmers children for higher education in universities need to be created using this fund.
- Skill and entrepreneurship development degree, diploma and certificate courses being conducted in State universities and colleges should be linked more for practical experience at public and state of the art private organizations.
- Training/ attachment of students with progressive farmers, well-established youth entrepreneurs, research & training institutes and credible NGOs should be made integral part of the study course.
- MSME Department has formulated very valuable schemes for establishment of agri entrepreneur/ processing of agricultural produce businesses at the farmers' level. However, there is strong need to make awareness about these amongst the farmers at the grass root level.

4.9 Special incentives to Ex-servicemen

The Indian Armed Forces retire 50,000 veterans annually, of which, about one-fifth are from Haryana. A significant number of these veterans settle down in their villages. Although, they are spread all over the State, south Haryana has a higher proportion of the veterans,

which is otherwise a relatively more backward area in agriculture. At present about 3 lakhs Ex- servicemen are registered for jobs in Haryana. There might be some more who have not registered. Further, about 7-8 thousand are added every year with some completing their proud life span. Thus, the figure is likely to remain around 3 lakhs with deviations due to changing trends. This resource can be developed as rural sector entrepreneurs to provide last mile connectivity for agriculture research centers and agriculture universities. Rehabilitation of Ex-servicemen with respectable income and secured retired life is a national responsibility as they have survived risking their lives for the country. This is all the more important with the introduction of Agniveer scheme. Diverse micro-industrial opportunities could arise through training of veterans as rural sector entrepreneurs, particularly in fields which have very high demand of skilled manpower. The advantages that veterans, who have settled down in rural sector have: -

- They reside in villages and are sensitive to understanding of local barriers, limitations and opportunities in delivering agribusiness services or installing or maintaining renewable energy equipment.
- Their secondary level educational skills, familiarity with handling equipment etc. and exposure to different places, societies and cultures in India.
- Relatively younger age of their retirement (average 34 to 40 years) gives them 30 odd years of entrepreneurial life in rural communities.
- They have a higher risk-taking ability due to an assured monthly pension.
- Veterans trained in agro enterprise development have better possibilities of mediation and developing backward linkages with other farmers in their villages, which needs to be encouraged for broader participation of farmers in value added horticulture under polyhouses, high-tech dairy, poultry, food-processing etc.
- It is suggested that in all ongoing government schemes for rural development including agriculture, horticulture, animal husbandry, fisheries, agro- processing, rural industry etc., wherever subsidy is provided to the farmers/entrepreneurs, the Ex-servicemen may be extended the subsidy at the same rates as applicable to SC beneficiaries.
- Besides, retired professionals from the fields of agriculture, environment, education, medicine and agribusiness etc. settled in Haryana should be associated with welfare of the farmers by making a scheme.

4.10 Single window extension and delivery system

The country launched the Community Development Programme in 1952 and a year later the National Extension Service. It was envisaged that a Village Level Worker (VLW) will be the channel for all development activities in the village. The philosophy was to provide a single integrated resource in the village. Very soon the system started its disintegration and today we have a multiplicity of extension systems operated by a multiplicity of agencies using a multiplicity of technologies and multiplicity of terminologies. We have theoretical linkages and models developed by experts. Some of them are practical as well. The new situation has

its own problems. But now we cannot go back nor is it desirable to go back. Extension is no longer even a part of the development block. The Ministry of Rural Development is different from the Agriculture Ministry which is again different from the Fisheries and Animal Husbandry. We may further disintegrate with focus on specialization. Focus leads to narrowing of vision but focus is also needed. From the farmers point of view, he has no problem if the information is delivered at his doorstep by 10 persons instead of one but problem starts just when he wants to implement their advice. He then has to run at 10 places for adoption of their recommendation. A glaring example is that of starting a small dairy farm with a biogas plant. The farmer has to visit two departments for this although it is one composite unit. In fact, we need to motivate farmers who establish dairy farms to also have a biogas plant for many obvious reasons. If further the farmer wants to install a solar pump at his farm to meet the water requirements, he has to approach a third department. You can keep on adding to the list viz. arranging fodder seed, vermi composting etc. leave aside getting an electric connection.

The matter would go out of control if we talk about Integrated farming where we expect the farmer to have dairy, fisheries, mushroom, honey, horticulture etc. Integrated farming is important and we have been talking about it for more than three decades. The research system rose to the situation and systematic research has been carried out. ICAR established an institute for farming systems research over two decades back. State wise models have been developed by ICAR institutes and SAUS. But irony is that there is not even a single scheme on integrated farming launched by the GOI. The Task force makes following recommendations:-

- Establishing a Single Window System for farm entrepreneurs on the pattern of industry. This window should receive all applications at one place and get them processed by different departments in a time bound manner. Electric connection, water connection clearances from different departments such as Pollution Control Board, Town Planning department etc. should be obtained without any delay.
- NABARD may be requested to develop a scheme for finance by banks of integrated farming models developed by research Institutions. Subsidy for different components of the system may be merged. Farmer may approach the bank for the whole farming system or part of it and need not go to each and every department. Here we may take a clue from business and industry where a limit is fixed by the bank.
- Flexibility may be allowed in the schemes which are usually water tight. For example, the design of the dairy shed has been prescribed. When the number of farmers with small land holdings is so large, we have not considered limitation of land while formulating different schemes. Farmers innovate themselves. A progressive farmer with little land has installed a biogas in the basement under the dairy shed. This saves labour as the inlet of biogas is in the shed itself. The efficiency of the gas plant is better because the basement maintains a more stable temperature in winters. Most farmers seen in NCR store dry fodder in a room with a floor 2-3 feet lower than the floor of the house to make for more space. This is their own indigenous way because construction of a basement is quite expensive. Farmers with less than one acre land

must be given the flexibility of designing their farm units with multiple floors e.g. a basement for storage of feed and fodder, biogas and mushroom unit. The ground floor for dairy, vermi composting and machinery etc., first floor for goats/poultry and Hydroponics etc. This is only suggestive as seen on the farms developed by farmers themselves.

- Establishment of physical and/or e-library in all villages, upgradation of ICT skills and connecting all villages with internet service facility is necessary.

4.11 Linking farmers with the markets

4.11.1 Marketing of agricultural produce

Lack of proper marketing infrastructure, practices, pricing, information and regulations 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 stronger and more efficient to serve the interest of farmers and consumers. There is need to provide opportunities for increasing net incomes in the agriculture sector and creating a prosperous, progressive and proud farmer by setting up efficient and knowledge-based marketing systems and services. Setting up of efficient marketing services by integrating and professionalizing delivery of agricultural services is essential to provide better value for the farmer's produce.

- The State department of Agriculture and Farmers Welfare in collaboration with CCSHAU and MHU needs to develop a policy paper mentioning what crops/ commodities should be produced in which area of the State, as per agro-eco region suitability and potential. The purchase of these crops on MSP should be ensured. In case farmers grow some other crops which are not climatically suitable for that area, the government may not take responsibility for marketing of that produce.
- Some of the suggestions regarding marketing of produce include starting a pilot project for carrying various market operations like cleaning, drying, weighing, sieving etc. at farm level to avoid the glut of farm produce in the markets, establishment of Haryana Institute of Agricultural Marketing at Panchkula, exemption of agri products of FPOs and SHGs from GST to sustain their business, inclusion of nutri cereals in social sector schemes, charging market fee as in other states, development of virtual markets, adoption of SAFAL model of Delhi for fresh fruits and vegetables, establishment of Mushroom Development Board, MSP for honey to avoid distress sale, introduction of Pure Honey Hut concept as implemented in Himachal Pradesh, establishment of inland fish markets to promote export and encourage Foreign Direct Investment.

4.11.2 Procurement and MSP

In the State of Haryana, market arrivals of rice, wheat, cotton, pearl millet, mustard have witnessed strident increase due to growth in production. The increase in production resulted from faster adoption of improved production & protection technologies, use of quality

seed and better management skills of farmers. This resulted into increase in ratio of marketed surplus to production.

The Haryana State Co-operative Supply and Marketing Federation Limited (HAFED) is a leading agency for the procurement of food grains mainly paddy and wheat for the central pool. HAFED is also the largest supply chain network for distribution of agro-inputs such as fertilizers, pesticides and certified seeds to the farmers of Haryana at reasonable prices at the right place. It also sometimes procures pearl millet, barley and mustard at minimum support price.

The minimum support price (MSP) is an advisory price signal that is part of a larger set of agricultural policies in India. The recommendations of Commission for Agricultural Costs and Prices (CACP) take into account various factors like cost of production, changes in input price, trends in market prices, demand and supply situation, inter-crop price parity, effect on general price level, effect on cost of living, international market price situation, etc. for deciding MSP of various crops. In addition, the Commission also studies expected impact on nutrition and the imputed value of family labour. The CACP finally considers all paid out costs in respect of the above variables, called A_2, and the imputed value of family labour. Thus, CACP recommendation is a function of: A_2 = Actual expenses in cash and kind, including rent paid for leased-in land, and FL which is imputed value of family labour. Further, CACP adds a certain percentage of the A_2 cost as a profit margin and this together is recommended as MSP to the Government. MSP of 23 commodities covering seven cereals (paddy, wheat, maize, sorghum, pearl millet, barley, ragi), five pulses (gram, tur, moong, urad, lentil) and seven oilseeds (groundnut, rapeseed, soybeen, sesame, sunflower, safflower, niger seed) and four commercial crops (copra, sugarcane, cotton, raw jute) is fixed by the central government on the recommendation of CACP and aims to safeguard the farmer to a minimum profit for the harvest while at the same time increasing food security in the country. The effectiveness of such a price policy has varied widely between States and commodities. However, there are various concerns related to procurement and realization of MSP of crop produce in Haryana.

- The interactions with farmers of all districts of the State revealed that there is need to increase MSP of all the crops and to link it with price index of all commodities. Looking into sharp rise in prices of agro-inputs and labour wages, the Task Force recommends 80% profit margin to the farmers over and above the cultivation cost, while fixing MSP of all the crops.
- The following other measures are suggested: -
    i. Starting procurement at MSP with the arrival of produce in the market and continuing till all surplus produce with the farmer is procured.
    ii. Warehouses registered with the WDRA should be allowed to facilitate trade to reduce glut of produce in the market.
    iii. State government should allow direct purchase from the farmers by processing units.

iv. Grant of subsidy on cost of transportation of perishable commodities for sale in distant markets, and exemption of toll.

v. Designating a nodal agency to link producer with consumers like agro- malls, retail business houses and residential societies in urban areas etc.

vi. Fixing Minimum Purchase Price (MPP) for commodities not covered under MSP in the State like Maximum Retail Price (MRP) in case of industrial goods/ commodities.

vii. Grant of incentives for staggered procurement to reduce glut of produce in post-harvest period.

4.11.3 Management of perishable commodities

- Creation of cool chain, storage and processing facilities for all perishable commodities at cluster of villages/ block/ district levels with the major involvement of private sector is need of the hour. Such facilities also need to be established at the village level through the involvement of big resourceful farmers. Such farmers may be given incentives to venture into this business.
- Government may consider covering all perishable commodities under MSP on the pattern of other grain crops. This change will be difficult but urgently needed in the interest of farmers' welfare. Involvement of private sector to make it happen will be of utmost importance.
- A scheme needs to be drafted for management of byproducts and waste of vegetables & fruits in the vegetable markets available daily after the auction of the main products. This can help augmenting green fodder requirement and can be linked to welfare of animals in the Gaushalas. Such a scheme will also supplement government mission of Swatch Bharat.
- The present system of marketing perishables through the commission agents has undergone from bad to worst. It has created a huge gap in the price the farmer gets for his commodity, and the price which consumer pays. Many times, consumer pays 4 to 6 times of the actual price of the commodity which the farmer gets in the whole sale market. There is strong need to develop a new system for marketing of perishable commodities.

4.11.4 Storage of farm produce and processing

Haryana has surplus production of foodgrains (rice, wheat, pearl millet), edible oilseeds (mustard) and commercial crops (cotton, sugarcane). The State is the second largest contributor to central pool. At present, State has storage capacity of 104.37 lakhs tonnes. The FCI and its associate partners alone have a share of 45.68 per cent of total storage capacity in the State. The cold storage constructed mainly to store perishables and high value crops in the State have capacity of 2720.44 lakhs tonnes. (Sonipat (22), Kurukshtera (21), Yamunanagar (13) and Sirsa (11) share 67 per cent of total cold storages and

contributing 70.12 per cent of total storage capacity. However, State needs to plan for covered storage for its all agricultural produce by 2047.

- At present, the State has few flour mills. There is strong need to establish wheat flour mills in all districts of the State to add value to the produce. This will help in increasing income of the farmers and make available good quality flour to the consumers. The farmer-industry linkage can play a significant role in doubling farmers' income; hence need promotion.
- The processing plants already established need to be made functional by promoting cultivation of those crops for which these facilities were created. For example, turmeric processing plant at Radaur is no more functional. Turmeric is a good medicinal export-oriented crop. Its cultivation in Radaur area in cluster of villages mode can be initiated as alternate to rice cultivation**.**
- Mustard and Pearl Millet are the main crops in south-west districts of Haryana. Processing facilities for these crops need to be established in this region on priority.
- There are very innovative women entrepreneurs in Palwal district running FPOs for processing of agricultural commodities. Their skills need further upgradation through trainings at the centres of excellence in India and abroad.
- There is need to revive Co-operative Societies and their strengthening by one time grant package. The facilities created under the Co-operative Societies in the past need to be upgraded looking into the present day need of storage, marketing and processing of agricultural commodities.
- The following other measures are recommended: -

  i. State level institute for post-harvest management of agricultural produce on the pattern of CIPHET, Ludhiana may be established.

  ii. Motivation of farmers by State Ware Housing Corporation by offering discounted rates for storage of their produce in ware houses.

  iii. Imparting free of cost training to farmers for scientific storage and preservation of agricultural produce.

  iv. Increasing food grain storage infrastructure under Private Entrepreneur Guarantee Scheme (PEGS) by Food Corporation of India, with priority to construction of silos in public private partnership.

  v. Providing financial assistance for metal bins for safe storage of food grains.

  vi. Creation of warehousing facility at village and at cluster of villages level in PPP mode by providing incentives to FPOs/SHGs/farmers group and individual resourceful farmers.

  vii. Creation of cold storage facilities for perishable commodities like fruits and vegetables near to market and making them available at nominal charges to farmers.

viii. Construction of storage godowns on Panchayat land on long term lease basis and waiving off the condition of CLU for this purpose.

ix. Creation of adequate food grain storage facilities in the NCR region to regulate smooth supply of essential food items.

x. Construction of sufficient number of storage-cum-pack houses in high production zones of fruits and vegetables to reduce post-harvest losses.

4.11.5 Post-harvest management and value addition

Post harvest wastage in fruits and vegetables ranges between 15 to 35 percent. The loss in grain crops varies from 5 to 15 percent. There is strong need to develop policy incorporating development of post-harvest processing facilities and creation of cool chain infrastructure in cluster of villages, block and district level. The individual farmers should be encouraged by providing incentives to develop primary processing facility to manage the perishable commodities they are growing. The prices of vegetables and fruits crash beyond expectations during the crop season and sky rocket during the off season. In the recent past, tomato was selling at Rs 100 to 150 a kilo in the market. The same tomato sold @ Rs 3 to 10 a kg when the farmers' produce was in the market. The state govternment has formulated the Bhawantar Bharpai Yojna for 26 crops to help/ compensate the farmers during price crash scenario in the market. This is good scheme and must be continued and extended to all crops. However, this is a temporary arrangement. The need is to find out permanent solution to this generic problem being faced by the farmers. The following measures can be adopted in this regard: -

- Establishment of multi commodity Agro-Processing Centres (APC) at village/block level.
- Promoting and incentivizing village level micro industry such as oil extraction unit, dal mill etc.
- Establishment of cold chains.
- Establishment of export-oriented processing hubs.
- Establishment of state level institute for post-harvest management and value addition.
- Skill and entrepreneurship development among rural youth at district level.
- Exemption from licensing of small agro processing units like kohlu.
- Simplification of procedure for CLU to establish processing units in rural area.
- Establishment of food parks in each district of the State.
- Establishment of eco-friendly rural waste management complexes at village level.
- Installation of guar gum, castor and mustard oil extraction processing units in south-west Haryana.
- Setting up of incubation centres to promote entrepreneurship in agri-product processing in association with CCSHAU and NIFTEM.
- Production of diversified products from Murrah buffalo milk.

4.11.6 Trade of agricultural produce

Haryana had 8.2% share in the total agricultural export of India with worth of Rs.21,000 crores in 2019-20. The main products like rice including basmati rice, guar gum, and infant formula from milk derivatives, leguminous vegetables and honey are some key exports from the State and contribute about 94% of total agriculture export of the State.

- Haryana is leading State for export of Basmati rice in India since long time. About 50 per cent of total rice area of about 14.00 lakhs ha is captured by basmati rice in the State in recent years due to export demand and premium price in the domestic market. Basmati rice produced in Taraori region of the State is preferred in international markets over basmati rice from any other parts of the world due to its unique aroma, softness and elongation after cooking. The export of basmati rice from India has steadily increased from less than 5 lakhs tonnes in early 1990s to 32 lakhs tonnes in year 2011-12 and further it touched the level of 39.48 lakhs tonnes with value of 3540.40 million US dollars. There is strong need of identifying Basmati rice zones for pesticide free production for only export purpose.
- Guar is another important commercial crop and about 80 per cent of the world demand for guar gum is met from India. Haryana accounts for 11 per cent of national production of guar gum. About 75 per cent of the guar produced in the State is exported in the form of guar gum and its derivatives. The State has number of guar processing units located in western Haryana. The State should give priority to establish modern processing and quality testing facilities at suitable locations within the State and encourage its proper marketing and export.
- State is one of the leading producers of quality button mushroom in the country and this strength need to be further exploited through commercial production, processing and export of high value mushroom.
- Haryana has the ability for production of high value crops and high potential for supplying agricultural products to overseas markets. Road network, water quality and irrigation, proximity to New Delhi airport strongly favour production of high value export-oriented products. Harnessing these opportunities and potential require a new vision to bring changes in production portfolios and develop value chain to integrate farm production with consumption and export.
- The State has high quality germplasm of Murrah buffaloes which is also in high demand in many other countries. A special programme needs to be formulated for large scale production of high quality Murrah buffaloes for export.
- The following measures can be adopted in this regard: -

  i. Identification of exportable commodities and exportable zones in the State.

  ii. Training farmers for good agricultural practices for exportable commodities.

  iii. Designation of MPU, Karnal as nodal agency for importing export- oriented germplasm.

iv. Capacity building and financial support to various stake holders (producer to exporter) involved in export of agricultural commodities.

v. Promotion, branding and marketing of value-added organic products for export.

vi. Establishment of quality control labs for certification of agricultural produce/ commodities earmarked for export.

vii. Setting up rigorous quality control mechanism in collaboration with Agricultural Produce Export Development Authority (APEDA), Food Safety and Standards Authority of India (FSSAI) and Plant and Animal Quarantine Centres to ensure export of commodities meeting international standards.

viii. Digitization and mapping of the land for export-oriented cultivation and registration of farmers and Farmer Producers Organizations.

ix. Reorienting research priorities for developing package of practices for export-oriented commodities in general and Basmati rice in particular by CCSHAU.

x. Designating a nodal agency to address various concerns related to production, processing, quality control, regulatory mechanism, packaging, leveling, transportation and storage etc. of exportable commodities.

xi. Constitution of a state level steering committee to monitor activities mentioned in agricultural export policy.

xii. Establishment of a marketing intelligence cell at State level involving marketing and agri-business specialists to provide latest information pertaining to standards, tariffs, sanitary and phytosanitary requirements, new export destinations etc.

xiii. Establishment of a special export cell at the State headquarters.

xiv. Creation of agri start-up fund for financial support to the export- oriented projects.

xv. Collaboration with Airports Authorities to build-up robust facilities at Delhi and Chandigarh airports to smoothen the export process.

4.12 Credit and agriculture finance

The agriculture sector has been facing problem of credit since long. Despite various schemes by the governments, the debt on the farmers has increased multifold overtime. Keeping in view the low income levels of farmers, it is necessary to take measures to improve the flow of credit to the framers. The following suggestions are made in this regard: -

i. Waiving off loans of landless agricultural farmers/ workers and small land holder farmers having land holding up to 2.5 acres.

ii. Establishment of Agro Finance Corporation by the State government to cater credit needs for heavy investment of capital in agro- processing industries.

iii. Involvement of new members in Primary Agriculture Co-operative Societies (PACS) and enhancement of maximum credit limit.

iv. Development of PACS as multi service centres to act as one stop shop for meeting all credit needs of the farmers.

v. Simplification of procedures for issue of Kisan Credit Card (KCC).

vi. Waiving off the charges for search/legal report by banks.

vii. Enhancement of KCC limit from Rs. 3 lakhs to Rs. 6 lakhs.

viii. Uniform rate of interest on KCC amount by all financial institutions in the State.

ix. Mortgaging land of the farmer as per value of the land and amount of credit demanded by the farmer as collateral security for taking a loan.

x. Grant of study loan to member of a farmer family (at least to beneficiary of PM-Kisan) at 2% lower interest rate than other categories.

xi. Providing credit to the farmers against pledged stored produce.

5. General Recommendations based upon stakeholders' feedback and suggestions

The Task Force had 12 meetings with different stake holders, including meetings exclusively with farmers representing all districts of Haryana at Karnal, Gurugram, Rohtak and Sirsa, two meetings with heads of departments/senior officers of the State government concerned with farmers' welfare at Panchkula; two days brainstorming meeting with senior officers of CCSHAU, LUVAS and MHU. The heads of KVKs, district level officers dealing with agriculture, horticulture, animal husbandry and fisheries, representatives from NGOs, private sector, industry also participated in these meetings. A gist of suggestions emerged in these meetings is summarized below.

1. Need for farmers exposure visits to centres of excellence in India and abroad.
2. State government should give highest priority for installation of solar energy operated tubewells.
3. Problem of wild animals including blue bulls was raised by the farmers in all the meetings. A scheme should be prepared to reduce damage by wild animals to their crops.
4. The farmers desired that seed production and processing facility should be decentralized so that quality seed is available to the farmers in their village itself.
5. Condition for license to install kohlu needs to be abolished.
6. For dairy loan, the existing infrastructure with the farmers to house animals should be considered instead of imposing the condition of new construction to house the animals.
7. Veterinary service for 24 hours at village level needs to be ensured.
8. The KCC limit should be raised from Rs. 3.0 lakhs to Rs.6.0 lakhs with the same rate of interest as applicable at present.
9. The farmers desired that the electricity supply of 8 hours daily to tubewells may be provided during day time instead of present system of alternate supply of 3 days during night and 3-4 days during day time. This will help saving water as the farmers manage water better during day time than keeping tubewells on auto mode during the night. Alternately, at least 2 to 3 hours electric supply during day time should be provided.
10. All canals/minors/water courses including drains should be cleaned before April every year and made free of any deposited silt.
11. The farmers suggested that search report fee taken by the banks for sanctioning agricultural loans to the farmers should be waived off. Similarly, GST on purchase of agricultural inputs including machinery may be waived off.

12. MGNREGA should be linked with agriculture during peak Rabi and Kharif seasons. MGNREGA activities should not be started during June, July, October, November and April months as it coincides with peak labour requirement for transplanting/ sowing/ harvesting of major rice and wheat food crops.

13. The farmers desired that all government schemes should be properly displayed at a common place in the villages. University students should be involved in agricultural extension and awareness creation work in the villages.

14. It came for discussion that farmers' children are not adopting agriculture profession being non remunerative business. Special efforts should be made to retain youth in agriculture profession.

15. The farmers and others suggested that cluster of villages as one unit approach for development of agriculture should be promoted. Farmers need one time support for minimum infrastructure creation at their farm to make them stand on their own feet.

16. The farmers shared that farmer friendly machinery to suit small and marginal farmers which account for more than 80% chunk of total farmers is not available. The costly heavy machinery currently provided with highest subsides suits only 15 to 20% medium and large land holder farmers.

17. The farmers running FPOs shared that it is very difficult to take loan for FPO. The procedure needs to be simplified.

18. The farmers desired that toll tax be made free for bee keepers and others engaged in agri- business of perishable commodities.

19. Need for agri specialist at village level to take up farmers' issues and problems with concerned officers at block/tehsil and district levels.

20. Some villages have totally stopped crop residue burning. Those villages should be given some special grant as an incentive for overall development of the village.

21. Many farmers reported that DSR is not successful to the desired extent. The subsidy/ cash incentives for this practice need review. Furrow irrigated raised bed planting is a better option to save water. There is need to promote this practice with incentives and subsidy.

22. Some of the self-help groups and FPOs operating in south west districts of the State are doing very good work in processing. They need further strengthening by providing incentives.

23. All animals should be covered under insurance.

24. For installation of solar pump, guarantee contract with the company is signed only for five years. The farmers desired that this contract should be extended to 10 years.

25. Need for LUVAS regional centre in Gurugram district was raised by farmers during meeting held at KVK, Gurugram.

26. The farmers desired that the authority to make change/ correction in Meri Fasal Mera Byora portal may be delegated at district level.

27. The portal for registering vegetables should be kept open depending upon vegetable availability as vegetables come for marketing at different seasons in different districts.

28. Subsidy on manufacturing vermi-compost and for installing gobar gas plant should be continued.

29. The farmers shared that stubble management machines are not needed in southern districts.

30. Protector/ conserver of natural resources should be honoured and polluter punished.

31. The electric connections to the farmers should be released within the specified shortest period after deposition of money. Now farmers' hard earned money remains with the electricity authorities for years together, may be 3 to 6 years in some cases. After receipt of payment, the connection should be released within 6 months.

32. Involvement of contractors for laying irrigation pipelines should be discouraged and responsibility may be entrusted to the duly elected member committees. The farmers also desired that GST on pipe lines may also be waived off.

33. The electricity tariff for processing units established by farmers like dairy, mushroom, agri- business units is charged on commercial rate. The farmers desired that it should be charged as per tariff charged for domestic electricity consumption.

6. Road map

Sr. No.	Subject	Interventions	Unit	Present status	2028	2037	2047	Remarks
1.	**Water management**	i. Conservation of rain water for ground water recharge						
		Construction of small check dams and pond based integrated farming system in Shivalik foot hill areas.	% area covered.	Only 5 to 10% area is covered with tree grass systems.	20%	50%	80%	It will help in recharging the ground water.
		Construction of small reservoirs alongside all the major rivers which pass through the State, with groundwater recharge tubewells and wells adjacent to these, reservoirs' strengthening and planting of soil binding trees and grasses on banks/dykes of all rivers.	% rivers covered.	Not initiated.	20%	45%	100%	It will help in controlling floods, recharging ground water and increasing water availability for irrigation.
		Construction of ponds in south west districts of Haryana in all the waste land and farmers' fields with dykes of the ponds to be planted with forest, fruit and fodder trees, high value herbs, aromatic and medicinal plants.	% area covered.	5 to 10% area is covered.	40%	70%	100%	Increased water availability for irrigation.
		Rehabilitation of Aravalli hills using trees, grasses and shrubs.	% area covered.	Some efforts initiated by forest department and others.	35%	60%	100%	In-situ rain water conservation.
		Construction of ponds in all farmers' land with at least half and/or one acre pond for every 10 to 20 acres land.	% area covered.	At present ponds are found sparingly in the farmers' fields.	20%	40%	80%	Whole rainwater conserved within the State.

		Promotion of high yielding short duration low water requiring crops.	% area covered.	Hardly 10 to15% area covered.	35%	80%	100%	CCSHAU todevelop varieties.
		ii. Increasing use efficiency of irrigation water						
		Large scale promotion of Furrow Irrigated Raised Bed (FIRB) Planting of Wheat-Moong/Mash-Rice crop rotation in Wheat-Rice growing area of the State.	% area covered.	Lest than 5%	30%	60%	100%	Water saving of 25% to 35%.
		Intensification of drip and sprinkler irrigation in the State in general and south west districts in particular.	% area covered.	Less than 10%	30%	70%	100%	Water saving by 50% to 70%.
		Shift from rice to alternate crops of cotton, maize, soybean, pulses and oilseeds.	% area covered.	In spite of incentives by the State government this shift is not happening.	10%	30%	50%	Water saving by 20% to 25%.
		iii. Re-use of waste water						
		Use of domestic waste water in agriculture as raw or mixing with fresh water.	% water used.	Less than 2%	20%	40%	50%	Eco-friendly disposal option.
		Use of mixed domestic and industrial (effluents) waste water in establishing green belts in wasted areas in the cities, along road and rail track sides.	% water used.	Less than 2%	10%	30%	40%	Increased forest cover, resilience of agriculture to climate change.
		Reclamation of waste water using sewage treatment plants for re-use in agriculture andother activities.	% water used.	Less than 20%	40%	60%	100%	Increased availability of water for domestic and industrial use.
2.	**Soil manage-ment**	**i.** Reclamation of water logged and salt-affected lands by: ● Vertical drainage ● Sub-surface drainage	% area covered.	About 2 lakh ha.	50000 ha	1.2 lakh ha	2.0 lakh plus new area added	Location specific application of technologies will be highly desirable. Past experience shows that sub-surface

		• Bio drainage • Bio amelioration using salt tolerant trees and grasses • Promotion of salt tolerant crops and varieties • Shallow tubewells in water logged areas					betwe en 2023 to 2047	reclamation technology is not successful every where.
		ii. Rehabilitation of sand mined areas and preparation of strict guidelines for future mining policy and stabilization of dykes of existing mines using soil binding trees, shrubs and grasses.	% mined area covered.	Presently dyke areas lying uncovered with vegetation.	20%	50%	100%	Greatly help in water storage and conservation during unexpected floods.
		iii. Preparation of revised soil quality map of the State, taking village as a unit and incorporating information about heavy metals and other toxins present in the soil.	Villages covered.	District wise soil quality map is available.	Village wise map prepar ed and publi shed	Map again up graded	Map again up graded	Soil is a biological entity and its quality is affected by climatic change scenario and management practices. Upgradation of soil health map after every 10 years in future will be highly useful for future food and nutrition security.
		iv. Preparation of upgraded soil health cards to all the farmers of the State incorporating information about micronutrients, heavy metals and other toxins.	% farmers covered.	Soil health cards are being issued under GoI scheme.	50%	100%	Revised cards issued	Accumulation of heavy metals in the soil is increasing and resulting in increase of serious diseases like cancer in human beings. Present soil health cards do not have information on pollutants, physical and biological parameters.

		v. Establishment of cluster of villages based permanent sites for soil quality monitoring over the time and entering the information on biannual basis in the registers which need to be maintained as a permanent record for future planning.	% area covered.	Few sites in the State are covered.	50%	80%	100%	This permanent information will help in incorporating timely preventive measures.
3.	**Climate change and agriculture**	I. Reductions in greenhouse gas emissions through sequestration in vegetation and soil. ● Increasing tree cover and integrating trees with agriculture ● Promotion of conservation agriculture practices. ● Shift from chemical fertilizer-based agriculture to organic and natural farming practices	% reduction in present level.	Authentic data for green house gas emissions at the State level not available.	20%	50%	100%	India has committed to reduce its green house gas emissions as per international commitments.
		II. Establishment of automatic weather stations in all blocks in the State.	% blocks covered.	Some blocks are covered with the facility of automatic weather stations.	50%	100%	-	Daily recording and monitoring of weather data for preparation of block level advisories will be available.
		III. Climate resilient and climate smart agriculture practices:· Promotion of integrated farming systems to manage climate change risk and sustain livelihood security. ● Promotion of protected cultivation/polyhouse agriculture	% area covered.	Work is in progress.	50%	100%	-	Maintaining climate change triggered increase in temperature below 1.2^0 C will be absolutely necessary.

		• Development of multi stress tolerant crop Varieties.						
		IV. Strengthening early warning and timely advisory mechanism to strengthen adoption and mitigation strategies to deal with climate change. • Establishment of an independent autonomous cell with separate budget provision in the Department of Agriculture and Farmers Welfare at Panchkula or at CCSHAU, Hissar to monitor climate change scenario in each district and to develop strategies to reduce/ negate climate change impact on agriculture at micro level. • Establishment of crop-weather watch group at Panchkula on the pattern of crop-weather watch group of Union Ministry of Agriculture and Farmers Welfare.	Cells established.	Not there at present.	100%	-	-	The purposed actions are absolutely necessary to negate/ moderate climate change impact on agriculture.
4.	Conservation of Biodiversity	• Listing present status of biodiversity of plants, animals and microbes in the State. • Systematic documentation of species vanished and strategies to revive and regenerate those at the verge of extension.	% work completed.	Authentic information on current status of biodiversity and its degradation during the past, reasons thereof is missing or partially available.	50%	100%		Conservation of biodiversity is crucial for welfare of the humanity.

		• Establishment of an independent biodiversity board in the State.						
5.	Crop diversification	**i.** Replacing area under rice crop with alternative cotton, maize, soybean, pulses, oilseeds. • Involvement of private sector in procurement, storage, processing, value addition, marketing and trade of alternate crops. • Promotion of diversification in cluster/block and district mode MSP for the diversified crop/ crops.	% area covered.	In spite of provision of incentives to the farmers, diversification from rice to alternate crops has not happened.	10%	30%	50%	Diversification from rice to low water requiring crops is need of the hour to save ground water for future use.
		ii. Promotion of integrated farming on small and marginal land holdings.		Area under integrated farming is almost negligible.	5 - 8%	15-20%	20-30%	This is only way to double farmers' income on small holdings and to conserve natural resources for future generations.
6.	**Crop residue manage ment**	**i.** In-situ management- • Fodder • Mulch • Manure	% farmers covered.	5 to 10% small and marginal farmers adopt these techniques.	60-80%	100%	-	About 83 percent farmers in Haryana are small and marginal. They do not need costly heavy machinery for residue management. Need to provide incentives and subsidy for in- situ management of crop residue on the pattern being given for purchase of machinery.
		ii. Ex-situ management- • Bailing after combine harvesting	% area covered.	The machinery provided by the Govt. on highly subsidized rates which has	20%	100%	-	The better option to manage crop residue is in-situ management. The residue

		• Manufacturing card board and paper • Biomass based energy production, CNG • Ethanol production • Burning in furnaces as energy source		contributed significantly in reducing crop residue burning incidents in last 2 to 3 years.				management machinery is hardly used for 30 to 40 days in a year.Transport of so much residue through vehicles puts lot of pressure on transport system.
7.	**Increasing area under forest cover**	**i.** Promotion of silvipastural/ agroforestry system in Shivalik foot hill areas. **ii.** Promotion of forestry and Agroforestry in Aravalli hills and south west districts. **iii.** Integration of multipurpose forest and fruit trees with crops in a unified agroforestry system. **iv.** Planting trees on all waste land, uncultivated Panchayat lands, along the road and railway tracks, canal sides. **v.** Planting trees on all the river banks of the State, dykes of all ponds and reservoirs, bio drainage and creating green belts in big cities of the State.	% area under forest.	At present hardly 2 to 3 percent area is under forest.	1.5% 1% 1% 1%	3.5% 3% 3% 3%	5% 5% 4% 4% 3.5%	For maintenance of ecological balance, the State need to have at least 33% of its area under forest cover. Large scale planting of trees to sequester CO_2 to manage rising temperature and associated change in climate has become absolutely necessary.
		Total			5.5%	15%	21.5%	
8.	**Holistic development plan for villages**	• Digging ponds for rain water harvesting, its banks/dykes planted with fruit, forest and fodder trees. • Herbal and nutritional garden. • Library and Internet facility.	% villages covered.	Only few facilities are existing in few selected villages.	20%	50%	100%	There is need to provide civic amenities in villages at par with cities to retain youth in villages.

		• Separate gym for men and women. • Solar system to operate street light and sprinkler irrigation systems. • State-of-the-art Park for walking and yoga facility. • Sports facility on 'one sport one village' concept. • State-of-the-art primary health centre. • Cattle hostel/ a small gaushala for shelter of abandoned animals. • Health card for rural population in villages						
9.	**Livestock including fisheries**	**i.** Increasing population of elite bulls using embryo transfer and cloning technology. • Maintaining at least two elite buffalo bulls and two cattle bulls in each village.	% villages covered.	Only counted number of bulls are available in selected villages.	30%	70%	100%	To improve milk productivity.
		ii. Production and delivery of vaccines at the door step of farmers. • Recombinant vaccines with advantage of better immunity and long shelf life.	% animals covered.	At present farmers visit the veterinary hospitals for vaccination of their animals.	50%	100%	-	Best option to save animals from unexpected outbreak of mysterious diseases like LSD.
		iii. Mobile vans to deliver veterinary services at the door step of farmers.						
		• Milk processing mobile vans.	No. of vans.	100	500	800	All villages covered	It will contribute to skill and entrepreneurship development of village women.

		• Mobile hospital vans.	No. of vans.	Only few.	300	600	All vil lages covered	Farmers experience extreme difficulty in transport of sick animals to the hospital.
		• Mobile milk collection vans.	No. of vans.	Few areas are covered by Vita, Amul and other dairies.	500	1000	All vil lages covered	Will reduce exploitation of small and marginal farmers by milk collector and small dairyowners.
		iv. Separate portal for listing all animals in the State. • Breeds of the animals. • Milk production efficiency. • Health statusProgeny history.	No	Not existing.	Portal launch ed	-	-	This initiative will help in keeping all information of animals at the table of everyone concerned.
		v. Establishment of animal hostel at village and cluster of villages basis to deal with menace of stray cattle.	% villages covered.	No such provision exists.	20%	50%	100%	Will greatly help in welfare of cattle and reduction in road side accidents.
		vi. Checking manufacture and trade of artificial milk in the State.	% reduction from present level.	Significant incidences of the menace reported.	50%.	75%	100%	It will help small and marginal farmers who rear animals to realize good price for their genuinely produced milk.
		vii. Promotion of fisheries in the State. • Soil and water testing laboratories.· Cold storage and processing facility.	Acres covered.	Shrimp was cultivated on 1250 acres and other fish on 2942 acres during 2022.	10000	20000	50000	Lot of scope for saline aquaculture and general fish cultivation in village and farmers' field ponds.
		viii. Promotion of goat, sheep and pig farming amongst landless labourers, small and marginal farmers. **ix.** Promotion of artificial insemination in goat and sheep.	-	Many BPL families in the State rear goat and sheep to earn their livelihood.	All farm-ers below the poverty line mainly	-	-	Most profitable activities to earn good livelihood and income with minimum investment.

					landless should be encouraged with incentives to enter into these activities.			
		x. Establishment of plants near Gaushalas for production of Bio CNG, electricity, compost and other value-added products.	% Gaushala covered.	Only at few places tried.	30%	60%	100%	A way forward to promote organic and natural farming.
10.	**Horti culture**	Establishment of centers of excellence and certified nurseries for making available quality seeds and saplings of fruits, vegetables, flowers, aromatic and medicinal plants.	-	Few centres of excellence in collaborative mode have been established.Certified and accredited nurseries are non-existent.	At least one centre of excellence and 10 certified nurseries in each district of the State.	One additional centre of excellence plus 10 nurseries in each district	Each district of the State to have separate centre of excellence for fruits, vegetables, flowers and high value aromatic, medicinal/ herbal crops	Increased availability of quality seed and planting material of horticultural crops at doorstep of the farmers.

		ii. Promotion of underexploited high potential edible cactus *Opuntia ficus* indica as fruit, vegetable and medicinal crop in low rainfall and water scarce area of the State.	-	Most people of the State are not aware about remarkable properties of this plant.	Import of promising germplasm from Mexico and other countries and establishment of demonstrations in south west districts and Shivalik foot hills.	Raising commercial plantation of fruit and vegetable varieties.	Export as a fruit, vegetable and medicinal crop.	The crop has been tested in different states of the country and found promising.
		iii. Promotion of hydroponics/ tissue culture technology for production of quality seed of potato.	% of seed requirement.	5 to 10% of potato seed is produced at the State level using these techniques.	30%	60%	100%	The major expenditure on cultivation of potato crop is on seed. Potato seed raised through tissue culture/ hydroponics technique will reduce cost of cultivation significantly and higher profit to the farmers.
		iv. Creation of infrastructure for processing of horticulture produce to reduce post-harvest losses.	% reduction losses	Post- harvest losses in fruits, vegetables and other perishables range from 15 to 30%. At present hardly	50%	100%	-	The value of the produce increases several folds on processing.

			from present. level.	10 to 15% of the total horticulture produce is Processed.				
		v. Creation of covered storage facilities with in-built cool chain freezing provisions.	% produce covered.	Very limited storage facilities are existing in the State.	40%	80%	100%	Once the covered storage facility is created, fluctuations in price of tomato, potato, onion etc. will narrow down.
11.	**Organic and natural farming**	Need to increase area under organic and natural farming by establishment of FPOs for organic/ natural farming produce. ● Fixing MSP for organic produce. ● Establishment of certification and accreditation lab in each district. ● Separate space for organic produce in fruit and vegetable markets. ● Allotment of special booths to organic producers at bus stands/railway stations and other public places for show casing and sale of their produce. ● Simplification of procedures for export of organic produce.	Area in ha.	The target fixed for 2023 is 23000 ha.	2.5 lakhs ha	5 lakhs ha	8 lakhs ha	Need to reduce indiscriminate use of agro- chemicals in agriculture.
12.	**Large scale promotion of renewable energy**	Solar, wind, water biomass and solid waste materials-based energy production.	% solar energy in total.	Solar energy is being exploited in a big way.	20%	35%	50%	Energy is going to be a critical issue for future economic development of the country. There will be strong need to create infrastructure for generation of renewable energy in the State.

13.	**Environment Conservation**	Management of untreated domestic and industrial effluents. ● Strict monitoring of ground water quality in terms of heavy metal and toxins contamination in catchment areas of four major rivers of the State. ● Need for eco-friendly disposal of untreated solid waste in the State.	% effluents treated.	Reports indicate that 50 to 60% of solid waste generated in the State is not at allcollected and, is a major concern for environmental pollution.	50%	100%	-	The toxic waste water effluents currently disposed into the rivers can be converted into assets after their treatment by establishing sewage treatment plants in all big and small cities and towns in the State.
14.	**Marketing of agriculture produce**	● Establishment of private and cooperative markets and permission to farmers for direct sale to these organizations. ● Establishment of specialized modern markets for perishable commodities in Gurugram, Jhajjar and Faridabad districts. ● Setting up of agri business centres at all district headquarters. ● Fixation of MSP for major fruits and vegetables, milk, egg and meat. ● Establishment of food quality testing labs at district. ● Facilitation of direct marketing by farmers to consumers by providing incentives. ● Development of roadside markets alongside the highways for direct sale by farmers. ● Formulation of appropriate	-	Action on some of the suggested interventions is in progress.	30% action completed	70% compliance	100% compliance	The suggested action points for improvement in marketing of agricultural produce will certainly make the farmers happy.

		guide lines, rules and regulations to promote contract farming. ● Establishment of community food grain and fodder banks for welfare of the livestock. ● Starting a pilot project for carrying various market operations like cleaning, drying, weighing, sieving etc. at farm level to avoid the glut of farm produce in the markets. ● Establishment of Haryana Institute of Agricultural Marketing at Panchkula. ● Exemption of agri products of FPOs and SHGs from GST to sustain their business. ● Inclusion of nutri cereals in social sector scheme. ● Charging Market fee as in other States. ● Development of virtual markets.· Adoption of SAFAL model of Delhi for fresh fruits and vegetables. ● Establishment of Mushroom Development Board. ● MSP for honey to avoid distress sale. ● Introduction of Pure Honey Hut concept as implemented in HP.						

		• Establishment of inland fish markets to promote export. • Encourage Foreign Direct Investment.						
15.	**Post harvest management and value addition**	• Establishment of multi commodity agro-processing centres (APC) at village/block/ tehsil level. • Promoting and incentivizing village level micro industry such as oil extraction unit, dal mill etc. • Establishment of cold chain. • Establishment of export-oriented processing hubs. • Establishment of state level institute for post-harvest management and value addition. • Establishment of skill and entrepreneurship development among rural youth at district level. • Exemption from licensing of Small agro processing units like kohlu. • Simplification of procedure for CLU to establish processing units in rural area. • Establishment of food parks in each district of the State. • Establishment of eco-friendly rural waste management complexes at village level.	-	These activities are in operation at a limited scale.	30% action completed	70% action completed	100% action completed	Post-harvest value addition to agriculture produce will certainly help doubling farmers income.

		• Installation of guar gum, castor and mustard oil extraction processing units in south-west Haryana. • Setting up of incubation centres to promote entrepreneurship in agri-product processing in association with CCSHAU and NIFTEM. • Production of diversified products from Murrah buffalo milk.						
16.	**Procurement and MSP**	• Starting procurement at MSP with the arrival of produce in the market and continuing till all surplus produce with the farmer is procured. • Warehouses registered with the WDRA should be allowed to facilitate trade to reduce glut of produce in the market. • State government should allow direct purchase from the farmers by processing units. • Grant of subsidy on cost of transportation of perishable commodities for sale in distant markets, and exemption of toll. • Designating a nodal agency to link producer with consumers like agro- malls, retail business houses and residential societies in urban areas etc.			30% action completed	70% action completed	100% action completed	

		• Fixation of MSP of the agricultural crops at least 1.8 times of C_2 cost of production. The C_2 cost should also include the rent paid for any leased- in land, the imputed rent for the owned land, the interest on owned fixed capital and imputed value of wages to family labour, in addition to the A2 cost. Linking the fixation of MSP of agricultural crops with price index of all commodities in general and agricultural inputs in particular. • Fixing Minimum Purchase Price (MPP) for commodities not covered under MSP in the State like Maximum Retail Price (MRP) in case of industrial goods/commodities. • Grant of incentives for staggered procurement to reduce glut of produce in post-harvest period.						
17.	**Storage of farm produce**	• Motivation of farmers by State Ware Housing Corporation by offering discounted rates for storage of their produce in ware houses. • Imparting free of cost training to farmers for scientific storage and preservation of agricultural produce.	% produce in covered storage.	Covered storage to store all the grains produced in the State is lacking.	80%	100%	-	10 to 15 percent increase in food grain availability.

		• Increasing food grain storage infrastructure under Private Entrepreneur Guarantee Scheme (PEGS) by Food Corporation of India, with priority to construction of silos in public private partnership. • Providing financial assistance for metal bins for safe storage of food grains. • Creation of warehousing facility at village and at cluster of villages level in PPP mode by providing incentives to FPOs/ SHGs/farmers group and individual resourceful farmers. • Creation of cold storage facilities for perishable commodities like fruits and vegetables near to market and made available at nominal charges to farmers. • Construction of storage godowns on Panchayat land on long term lease basis and waiving the condition of CLU off for this purpose. • Need to create adequate food grain storage facilities in the NCR region to regulate smooth supply of essential food items. • Construction of sufficient number of storage-cum-pack houses in high production zones					

		of fruits and vegetables to reduce post-harvest losses.						
18.	**Trade of agriculture produce**	• Identification of exportable commodities and exportable zones in the State. • Training farmers for good agricultural practices for exportable commodities. • Designation of MPU, Karnal as nodal agency for importing export- oriented germplasm. • Capacity building and financial support to various stake holders (producer to exporter) involved in export of agricultural commodities. • Promotion, branding and marketing of value-added organic products for export. • Establishment of quality control labs for certification of agricultural produce/commodities earmarked for export. • Setting up rigorous quality control mechanism in collaboration with Agricultural Produce Export Development Authority (APEDA), Food Safety and Standards Authority of India (FSSAI) and Plant and Animal Quarantine Centres toensure export of commodities meeting international standards.	-	-	30% action completed	70% action completed	100% action completed	

		• Digitization and mapping of the land for export-oriented cultivation and registration of farmers and Farmer Producers Organizations. • Reorienting research priorities for developing package of practices for export-oriented commodities in general and Basmati rice in particular by CCSHAU. • Designating a nodal agency to address various concerns related to production, processing, quality control, regulatory mechanism, packaging, leveling, transportation and storage etc. of exportable commodities. • Constitution of a state level steering committee to monitor activities mentioned in agricultural exportpolicy. • Establishment of a marketing intelligence cell at State level involving marketing and agri-business specialiststo provide latest information pertaining to standards, tariffs, sanitary and phytosanitary requirements, new export destinations etc. • Establishment of a special export cell at the State headquarters.						

		• Creation of agri start-up fund for financial support to the export- oriented projects. • Collaboration with Airports Authorities to build-up robust facilities at Delhi and Chandigarh airports to smoothen theexport process.						
19.	**Credit and agriculture finance**	• Waiving off loans of landless agricultural farmers/ workers and small land holder farmers having land holding up to 2.5 acres. • Establishment of Agro Finance Corporation by the State government to cater credit needs for heavy investment of capital in agro- processing industries. • Involvement of new members in Primary Agriculture Co-operative Societies (PACS) and enhancement of maximum credit limit. • Development of PACS as multi service centres to act as one stop shop for meeting all credit needs of the farmers. • Simplification of procedures for issue of Krishi Credit card (KCC). • Waiving off charges for search/ legal report by banks.		Small farmers are under debt.	100%	-	-	It will be one time chance to make them stand on their own feet.

		• Enhancement of KCC limit from Rs. 3 lakhs to Rs. 6 lakhs. • Uniform rate of interest on KCC amount by all financial institutions. in the State. • Mortgaging land of the farmer as per value of the land and amount of credit demanded by the farmer as collateral security for taking a loan. • Grant of study loan to member of a farmer family (at least to beneficiary of PM-Kisan) at 2% lower interest rate than categories. • Providing credit to the farmers against pledged stored produce.						
20.	**Special incentives to ex-servicemen**	• Development of ex-servicemen as rural sector entrepreneurs. • Delivering agribusiness services in rural areas or installing or maintaining renewable energy equipment. • Facilitation of start-ups in villages for innovation such as agribusiness, dairy farming, food processing, fisheries, poultry etc. • Provide service centres for integrated solar power or renewable energy etc.	% Ex-service men covered.	About 3 lakhs ex-servicemen are registered for jobs in Haryana, with annual addition of about 7-8 thousand.	30%	70%	100%	Gainful employment of useful and trained resource.

21.	**Single window system for farm entrepreneurs**	• Setting up single window system for farm entrepreneurs as in case of industry. • Developing a scheme by NABARD for finance by banks of integrated farming system (IFS) models developed by research institutions by merging subsidy for different components.	-	Not existing at present.	At least two IFS models in each village.	At least 10 IFS models in each village.	Coverage of at least 50% small and marginal farmers in the State under IFS model.	Integration of crops, dairy, horticulture, fisheries, mushroom, beekeeping, poultry, gobar gas plant etc. onthe field of small land holder farmers will help proofing for climate change related risks, promotion of organic and natural farming, reduction in cultivation cost and regular daily income.
22.	**Engagement of retired professionals from the fields of agriculture, environment, education, medicine and agribusiness etc. settled in Haryana with welfare of the farmers.**	• Registration of all retired professionals settled in Haryana and those who are willing to continue their profession to help farmers in their ancestral villages. • Preparation of a scheme to utilize services of retired professionals for the welfare of the farmers.	-	No such scheme/ initiative exists.	Scheme prepared	-	-	The retired professionals will get an opportunity to work with their own people and pay back to the soil of their birth place.

23.	**Promotion of information technology in rural Haryana**	• Establishment of physical and/ or e- library in all villages. • Upgradation of ICT skills. • Connecting all villages with internet service facility.	-	About 40 percent females and 82% males in rural Haryana have access to mobile phone.	60% rural population ICT skilled.	100% rural population ICT skilled.	-	Educated resource in agriculture will transform the sector.

Glimpse of Task Force interaction meetings with stakeholders

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