

DRAFT PLAN

**COMPREHENSIVE
DISTRICT AGRICULTURE PLAN
(C-DAP)**

**DISTRICT KURUKSHETRA
HARYANA**

**COMPREHENSIVE DISTRICT AGRICULTURE PLAN (C-DAP)
FOR RASHTRIYA KRISHI VIKAS YOJANA
OF XITH FIVE YEAR PLAN**

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CHAPTER-I

INTRODUCTION

The economic reforms commenced in 1991 has successfully put the economy in a higher growth orbit with more than 8 percent growth rate in total Gross Domestic Product (GDP) especially during the recent years. However, the agriculture sector which accounted for more than 30 percent of total GDP at the beginning of reforms failed to maintain its pre-reform growth. On contrary, it witnessed a sharp deceleration in growth after the mid 1990s as the per annum growth in agriculture sector dropped to 1.9 percent during 1996-97 to 2001-2002 from 3.2 percent in the period 1980-81 to 1995-1996. This happened despite the fact that agricultural productivity in most of the states was quite low, as it were, and the potential for the growth of agriculture was high. The 10th five year plan target of growth of 4 percent per annum in agriculture and allied sectors, set to reverse the sharp deceleration of 1996-1997 to 2001-2002 has not been achieved. The approach paper to the 11th plan also emphasized that reversal of the deceleration in agricultural growth witnessed after 1996 is a pre requisite for the success of this plan. A sustained and wide spread agricultural growth is a pre-condition of (rural) development in India as more than 50 percent of country's work force still depends upon agriculture for its livelihood. This slow growth in agriculture (including allied sectors) can be of great strain for the economy as agriculture is not only an important driver of macro- economic performance it also is an essential element of the strategy to make growth more inclusive. Concerned over this pace of growth in agriculture and allied sectors, the National Development Council (NDC), in its meeting held on 29th May, 2007 resolved that a special Additional Central Assistance Scheme i.e. National Agriculture Development Programme/ Rastriya Krishi Vikas Yojana (RKVY) be launched with following main objectives.

- ❖ To incentivise the States for increasing public investment in agriculture and allied sectors
- ❖ To ensure that agricultural plans of Districts/States are prepared and are based on agro-climatic conditions, availability of technology and natural resources.
- ❖ To reduce the yield gap in important crops and increase production and productivity in agriculture and allied sectors through focused and holistic initiatives.
- ❖ To ensure that local needs/crops/priorities are better reflected in the agricultural plans

of the Districts/States.

- ✘ To provide flexibility and autonomy to States in planning and implementation of agriculture and allied sector schemes.
- ✘ To maximize income of farmers in agriculture and allied sectors.

The eligibility for assistance from the Centre under the scheme would depend upon the State Government providing amounts in the Plan Budget of the State for agriculture and allied sectors over the baseline expenditure.

As per the NDC resolution Government of India introduced a new Additional Central Assistance Scheme to in sensitize States to draw up plans for their agriculture sector more comprehensively, taking agro-climatic conditions, natural resource issues and technology into account, and integrating horticulture, livestock, poultry and fisheries etc. This involves a new scheme for Additional Central Assistance (ACA) to State Plans, administered by the Union ministry of Agriculture over and above its existing centrally sponsored schemes, to supplement the state-specific strategies. In order to rejuvenate the agriculture during XIth plan a growth rate of 4 percent per annum has to be achieved (as per NDC commitment) by reorienting development strategies that meet the needs of the farmers. The agriculture growth being essential element of the strategy of making growth more inclusive, the NDC advised the State Governments on preparation of Comprehensive District Agriculture Plans (C-DAP) which includes allied agriculture sectors with full and efficient utilization of available resources.

The concept of integrated local area plans to raise living standard in rural area and over come food shortage based on specific endowments and needs of each area was initially mooted in 1st Five year plan in 1951, which could not be materialized in true sense as only sporadic efforts and isolated cases of such planning were practically attempted. For success of local area or District level plans the underlying constraints needed to be identified and required infrastructural investment, extension (and research system) revamping and market reach with the system's conduct and performance have to be synchronized through a holistic policy approach. Keeping this in view the C-DAP of district Kurukshetra is prepared for achieving sustainable agricultural growth with improved farmers' income through participatory process involving stakeholders and various organizations. By establishing

strong linkages with required institutional support services the plan will ensure optimum utilization of scarce natural, physical and financial resources.

The agriculture in the district can't possibly achieve same growth as in the past without recognizing the role of farmer's participatory approach for formulating strategies and finding solutions to new and emerging problems. Similarly due to globalization, trade in agriculture will expand and the district like Kurukshetra can hugely benefit when the trade expands and our farmers start making best use of such changes by becoming as secondary producer rather than a primary producer of agriculture commodities. Reforms based on globalization can now pave the way for commercial dairies and subsidiary occupations. The demographic changes due to fast urbanization and slow down in the population will bring greater prosperity in the middle class families. This will lead to some diversification in food habits leading to more animals and requirement of more cereals for animals. Food demand will go up not purely because of population rise but also because of more requirement of cereals as animal feed. Although indistrict like Kurukshetra where land used for agriculture will decrease but still there is no reason to believe that agriculture productivity has reached its plateau. New science like GM crops, and new approaches like resource conserving technologies will always help us to face new challenges in agriculture development.

Methodology

The C-DAP was prepared as per the process and methodology suggested by the Planning Commission, Government of India. The approach followed in preparation of the document was necessarily of Participatory Appraisal mode. CCS Haryana Agricultural University, Hisar, Haryana was identified as Technical Support Institute (TSI). The TSI, under the guidance of Director, Extension Education, provided all necessary technical help to planning units and support groups for preparation of this plan through participatory bottom-up process. The TSI trained the Planning Units/ Groups in Participatory Rural Appraisal techniques, designed formats for data collection, guided in data collection and analysis and conducted regular workshops and meetings and did hand holding where ever needed for plan preparation.

The responsibility of preparing C-DAP of Kurukshetra district was given to Krishi Vigyan Kendra, Kurukshetra. The KVK team, after receiving proper training from TSI held wide consultations with District/ Block/ Village Agriculture Planning Units of the District. The TSI conducted two days orientation workshop-cum-training programme on 30.3.08 and 31.8.08 at CCSHAU, Hisar. The following specific aspects were covered in the programme.

- Issues and challenges in Agriculture sector
- Planning concepts and district Planning
- Basic features and planning process of RKVY
- Vision, methodology and process of preparing C-DAP
- Participatory Rural Appraisal
- Farming system approach
- Farming situation based extension
- Integrated nutrient management(INM),Integrated pest management(IPM), Natural resource management (NRM),Human resource development(HRD), Marketing and other important aspects.

Data collection and consultation: The KVK team, after receiving proper training from TSI, held wide consultations with District/ Block/ Village Agriculture Planning Units of the district (different bodies/institutional arrangements under ATMA Scheme). Formal and informal meetings with Agriculture and line department staff and Panchayati Raj Institution's member were conducted at different levels. Collected secondary data and related statistics needed for planning from different departments and other sources.

Primary Data: For in-depth farm/ village level study covering important aspects of agriculture and allied fields, the district was divided into two distinctively Agro-eco-situations (AESs) as was done for SREP preparation under ATMA Scheme. From each AES one representative village (Yara from AES-I and Sandhola from AES-II) was selected for collecting required information on modified semi-structured schedules through PRA.

Con-current review and verification of data: The primary as well as secondary data collected was cross-checked through triangulations and verified from information available

with different government departments and PRA based exercises (earlier conducted by KVK and other agencies). The District Plan (draft), SREP and PLP of Kurukshetra district and other related documents/reports of different departments were consulted for preparing the C-DAP.

Holding farmer meetings at villages selected for representing AESs in the district

PRA was conducted covering the whole gamut of activities ranging from pre-sowing to post-harvesting and marketing related to agriculture and allied activities being undertaken by the villagers.

Work plan and activities before the preparation of plan-

- Meeting of resource team of KVK with line departments heads and officers and PRI's representative
- Discussed the farmer participation evaluation, time frame, activities and responsibilities of all involved in the plan.
- Discussed the plan and expected output from five year plan in progress. The stake holders were made clear about subsidies for seed, fertilizer and other inputs. Gaps that exist in achieving the targeted productivity growth across farmers' categories were identified through participatory process. This provided a sound base in developing and recommending Comprehensive District Agriculture Plan (C-DAP).

Following discussion were held-

- The current priorities were discussed with farmers. The promising new practices were identified and agreed upon with them. Responsibilities of all stake holders and surveyors were elaborated with staff.

Before meeting-

- The PRA schedule based on the past experiences and data required regarding the farmers' need was prepared.
- Important points for discussion containing proposed change in the practices (of management, varieties, site specific nutrient management, IPM, seed, soil health and allied activities) were included and the proforma for Gram Panchayat given in C-DAP manual was modified accordingly. The schedule was made simple and easy to understand.

During meeting-

- The meetings were ensured to be informal. The farmers were encouraged to participate, interact and make their own fair appraisals in the meeting. Lecture type meeting was avoided. Farmers were informed about the objective of the meeting. The dialogue was started; the gap analysis and current scenario regarding productivity, profitability and risks associated with different farming systems were discussed.

The possible changes targeted in the management practices were:

- Field preparation-zero tillage, bed planter, laser leveler
- Crop establishment-plant population, seed rate etc.
- Nutrient management-N and P rate, time, source, use of organic manure, basal and top dressing of fertilizer, application of K and micronutrients.
- Important pests based on economic importance including insects, diseases nematodes and weeds.

Measures which improve the efficiency of inputs including water (by improving water productivity), energy (by reducing energy intensity like less fuel and less electricity) and labour(mechanization).It has to be a campaigning tool and also a guide to policy.

To improve both productivity and profits and to generate rural employment, another option might be to reset the system approaches from a commodity approach to cropping system approach (Rice-wheat cropping system rather than rice or wheat as a separate commodity) and from cropping system approach to a farming system approach (Wheat-Buffer).

- Farmers and scientist came to general agreement on what to do to fill the gap on crops and allied activities.

Discussed about the proposed design, trials, Front line demonstration(FLDs) and other activities in a farming system approach keeping in view the following-

- (i) Profitability of cropping system and the rate of return. In order to achieve the rate of return, long term family support is suggested.
- (ii) Market infrastructure and marketing opportunities, custom hire services and some of the policy issues related to subsidy.
- (iii) Farmers' inability to invest in the productivity improvement as majority of farmers belonged to resource poor category.
- (iv) Work plan and activities for landless and resource poor farmers.
- (v) Collected and discussed the feed back regarding On-Farm and Off- Farm activities.
- (vi) Crop insurance and cyclical assistance were also discussed.
- (vii) Action Plan

CHAPTER-II

GENERAL DESCRIPTION OF THE DISTRICT

2.1 Introduction

Kurukshetra is a place of great Historical and Religious importance, revered all over the country for its sacred associations. It was here that the battle of Mahabharata was fought and Lord Krishna preached his philosophy of “KARMA” as enshrined in the Holy Geeta to Arjuna at Jyotisar. In the very first verse of Bhagwad Geeta, Kurukshetra is described as “DHARAMKSHETRA” i.e. Land of righteousness. Mythological, the name Kurukshetra applied to circuit of 48 KOS or about 128 Kms. which includes a large number of holy places, temples and tanks connected with the ancient Indian traditions and the Mahabharata war and Kuru the pious ancestor of Kauravas and Pandavas. Kurukshetra district was carved out of Karnal district in January 1973 and it was further reorganised in 1989 giving birth to district.

2.2 Location and Geographical Units

It is situated in the north eastern part of Haryana and is surrounded by Ambala district of Haryana and Patiala district of Punjab in the North, Karnal in the South and South Eastern Side, Yamunanagar district in the East and Kaithal district in the West. It is situated on the Grand Trunk Road and main Ambala Delhi Railway Line. Its distance from New Delhi is about 160 Kms. Kurukshetra district lies between latitude $29^{\circ} - 52'$ to $30^{\circ} - 12'$ and longitude is $76^{\circ} - 26'$ to $77^{\circ} - 04'$ in the North Eastern part of the state. Saraswati and Markanda are main rivers of the district.

The district has been divided into 2 subdivisions namely Thanesar and Pehowa . It has five development blocks viz., Thanesar, Pehowa, Ladwa, Babain & Shahabad It has 419

villages, all of which are electrified and linked with metalled pucca roads.

2.3 Demographic profile

The demographic details of the district are given in the district profile at a glance ahead.

2.4 Topography and agro-climatic characteristics

The land is totally plain with slope from North East to South and South Eastern direction. The climate is extremely hot and dry in summer and the temperature touches 45 degree Celsius in the month of May and June. It is hot and humid in the rainy season (i.e. July, August and early September) while it is extremely cold in the months of November to February and the temperature goes down to as low as 4 degree Celsius. District has average rainfall of 740 mm.

The land of district Kurukshetra is plain and fertile. Soils are medium to heavy in texture and pH varies from 7.5 to 8.9. The alluvial clay loam soil is ideal for crops grown in the district.

2.5 Irrigation and ground water

In Kurukshetra District, Tubewells are the main source of irrigation. The total irrigated area is 150000 hectares, which constitutes 100% of the net sown area. This is much higher than the State average of 84%. The gross irrigated area is 270000 Ha. which constitutes 5.1% of State's total gross irrigated area. The irrigation intensity of the District is 180 %. Out of the total irrigated area of 150000 hectares, area of 27000 Ha. is irrigated by canals and remaining area of 123000 Ha. is irrigated by tube wells.

2.6 Land Utilization Pattern

Out of total geographical area of 168000 hectares, the cultivable area is 151000 ha. and net sown area is 150000 Ha. The percentage of net sown area to total cultivable area is 99.3% which is much higher than State average of 93.1 %.

2.7 Farm mechanization

There are 14995 tractors, 11833 harrows, 2688 zero till seed cum fertilizer drills, 7280 power threshers, 300 combine harvesters, 14943 sprayers, 139 dusters, 478 straw reapers, 2 laser levelers, 2 bed planters in the district (2007).

2.8 Industries

Kurukshetra is an industrially backward district and there are no big industrial units in the district. There are 174 rice shellers, 6 units of hand made paper, 10 units of cattle feed, 5 solvent extraction plants and 10 units of straw board/ mixed board in the District. One sugar mill in cooperative sector is situated at Shahabad.

Table 1 : DISTRICT PROFILE AT A GLANCE

1		Geographical Area (Sq.Km.)	1530
	a)	No. of Blocks	5
	b)	No. of villages (inhabited)	419
	c)	No. of villages (electrified)	419
	d)	No. of villages connected by all weather roads	419
	e)	No. of villages having supply of potable water	419
2		Rainfall (mm) Normal Actual 2003 2004 2005	
		740 641 630 640	
3		Climate	Extremely hot and dry in summer & very cold in winter
4		Population (2001)	
	a)	Male	442328
	b)	Female	383126
	c)	Total	825454
	d)	Population Density per sq. km.	540

	e)	Population below poverty line (as per 1997-98 survey)	148105
5		Classification of workers	
	a)	Cultivators	73083
	b)	Agricultural Labourers	70111
	c)	Artisans	3,884
	d)	House hold/Cottage Industries	6407
	e)	Other workers	158791
6		Land Utilisation (In Hectares)	
	a)	Geographical Area (as per village record)	168000
	b)	Total Agricultural Land	151000
	c)	Net Sown Area	150000
	d)	Forest Land	1000
	e)	Barren Land	1000
	f)	Land not available for cultivation	15000
	g)	Area brought under high yielding variety of seeds :	
		Wheat 112000 Ha.	100%.
		Paddy 71000 Ha.	63.4%.
	h)	Cropping Intensity	184%
7		Size of holdings (Agriculture Census-2000-01)	No. Area
	a)	Less than 1 Ha.	28061 11106 ha
	b)	Between 1.0 - 2.0 Ha.	12946 17741 ha
	c)	Between 2.0 - 4.0 Ha.	14358 37728 ha
	d)	Between 4.0 - 10.0 Ha.	9821 51276 ha
	e)	Above 10.0 Ha.	1486 23535 ha
		Total	66672 141386 ha
8		Irrigation (In Hectares)	
	a)	Net Irrigated Area	150300
	b)	By Canals	27200
	c)	By Tube wells	123100
9		Consumption of Chemical Fertilizers & Pesticides	
		Nitrogen	382.00 Kg. per ha.
		Phosphorus	108 Kg. per ha.
		Potash	19 Kg. per ha.
		Pesticides	1.80 Kg. per ha.
10		Agriculture Support facilities	
	a)	Seed/Fertilizers/Pesticides Depots	1342
	b)	Rural Markets/ Mandies	
		Regulated markets	7
		Sub-yards	13
	c)	Rural Godowns	159

	d)	Cold Storages	40
11		Animal Husbandry (2003)	
	a)	Plough Animals	23777
	b)	Dairy Animals	
	(i)	Cows	85289
	(ii)	Buffaloes	272017
	c)	Sheep/Goat	15984
	d)	Poultry Birds	655199

Vision Document

Preamble

The RICE-Wheat Cropping System (RWCS) is the mainstay of agriculture in Kurukshetra district. A significant increase in the productivity of these crops immediately after the release of modern varieties brought about a paradigm shift in the agronomy of these crops. The advent of green revolution also brought about a change: better procurement policies, creation of infrastructure like marketing, electricity, digging of more tube-wells, use of more fertilizers especially after 1970s, use of more pesticides including herbicides after 1980s and further intensification of RWCS. The shock of herbicide resistance from 1993 to 1998 left a deep mark in Kurukshetra and other districts with similar cropping system: farmers embraced diversification and adopted sunflower, advanced the wheat sowings under all situations, accepted the concept of conservation agriculture by adopting zero tillage. The inspiration for such a paradigm shift was ahead of time because the crisis of herbicide resistance led to new opportunities.

After 40 years of green revolution, another shock of water crisis is under way. There has been a consistent but conspicuous decline in the water table during last 40 years. Subsidizing electricity also led to ignoring the consequence of hopelessly high energy use for extracting same amount of water from deeper depths. For many years we kept shrugging it off but now the time has come to relook at the whole cropping system for saving water and electricity. While drafting this plan, schemes have been included for starting special campaigns. Farmers can be persuaded to come to the rescue only if new technologies are risk free and provide adequate profits in any current year. Introduction of summer moong to displace summer rice, use of green manuring and lots of other resource conserving technologies will help farmers and policy makers cope with future water crisis, if any. Although this RWCS belt around Kurukshetra may contain enough water in the deeper zones but extraction of water from deeper layers will be more expensive and time consuming. With still more use of external inputs and adding the cost of water extraction, the sustainability of this cropping will always be a cause of concern. Therefore, reducing the cost of cultivation and diversification will remain a priority area. Most farmers are sheltered from high input costs by subsidies but such

subsidies now may have to be tagged with savings in natural resources. More a farmers saves without sacrificing yield more could be amount of subsidy.

The nutrient status in the soil has started to change with soils being low in phosphorus have increased significantly. Similarly the soil with potash category have been scale down significantly. The argument regarding imbalanced use of fertilizer has been brought forward, but farmers (based on the survey conducted in 2006 and 2007) in this region are using slightly more than recommended dose of nitrogen and full dose of phosphorus. Although, there does not seem to be a significant deviation between N and P ratio, but potash and micro nutrients may have to be rebalanced. Therefore, focus on ideal ratio of NPK, use of bio-fertilizers, use of pulses as intercrops, green manuring, use of farm yard manure and surface residue retention have to be brought in the form of special campaigns. Other issues include the use of micro-nutrient mixtures and extended use of gypsum. The decline in soil productivity with nutrients extraction is not always matched by nutrient input. The recommendation on fertilizer, therefore, may have to be revised upward to reach the target of 4% growth in productivity per year of rice and wheat in the XI plan. Similarly the increased incidence of insect diseases and weeds has to be monitored and managed.

Right now there is no risk free substitute of kharif rice or even wheat. But we need to accelerate our plans to diversify within RWCS through permutation and combination of resource saving varieties.. However, search of farmers for more and more profits can help catalyzing diversification in favour an integrated farming system leading to more milch animals per hectare, mushroom cultivation vegetable farming, intercropping and multiple land use systems.

Notables are instances of integration of vegetable and mushroom cultivation and up to some extent poultry and dairy farming where farmers have achieved commendable success, otherwise majority of the farmer are experiencing low productivity and profitability because of poor knowledge, inefficient integration without farming system technologies which include modern farm management skills that enable farmers to improve the efficiency, increase cropping intensity and to integrated and diversify into more high value commodities/enterprises in conformity with market trends. The allied enterprises are important part of the farming systems. Both price and income elasticity of demand for most of these enterprise's products are high. There is huge unfulfilled demand far these products. There exists high

potential for increasing the yield rates of these enterprises as the gap between present productivity (in the district) and the achievable yield and potential yield is quite large.

VISION STATEMENT

To meet the productivity growth targets, conserve the natural resources and integrate the farming systems to further boost the profitability of the farmers.

Priority Settings

- Varietal improvement, linkages and synergies with private sector for hybrids of rice, sunflower and vegetables.
- Popularizing RCT through laser leveling, zero tillage, bed planting, green manuring with Sesbania and summer moong cultivation.
- Improving water use efficiency to check depleting water table.
- Use of IPM in paddy, IWM in wheat and INM in all crops.
- Dairy management, mineral mixture feeding, breed improvement, deworming, and fodder production .
- Adoption of agro-based vocations.
- Introduction of agro forestry and horticulture in farming system.
- Knowledge up gradation of farm women

CHAPTER-III

SWOT Analysis

3.1 Introduction

SWOT as an acronym stands for strength, weakness, opportunity and threats of a technology or an organisation. These particulars basically serve as management tools for strategic decision making. SWOT analysis also serves as a diagnostic technique which helps in solving and strengthening the future projections and applications. Before, 1980's, this technique had been used in industrial management, but thereafter, it became an important exercise in all the fields of life. In the present scenario of agriculture, this technique can be an effective tool in understanding the emerging challenges of farming and different eco-systems and integrating them with requirements of agriculture in right perspective.

3.2 Major strengths of the farming systems in Kurukshetra district

- Suitable agro climatic conditions for crop rice- wheat dominant cropping system with dairy animals
- Good irrigation facilities through tube wells
- Less urban biasness, predominantly rural district
- Farmers are receptive and innovative with large acceptance of recommended inputs
- Marketing facilities for grain within 10 km
- Good transport facilities through rail and road
- Milk coop. societies at village level.
- Assured input availability net work.
- Financial help through banks and cooperatives available
- Mechanized farming gaining importance
- Adequate extension services
- Good communication facilities in villages
- Good linkages and synergy between university KVK and line departments
- Rice Sheller and sugar mill are at approachable distance

3.3 Weaknesses

- Declining water table
- Decreasing organic carbon
- Average rainfall at rice transplanting is erratic
- Increase in incidence of pests a diseases
- Injudicious use of pesticides
- Inadequate fodder production
- Poor management of organic waste.
- Monoculture of rice –wheat cropping system and its adverse effect on natural assets
- Labour availability scarce and costly
- Poor feeding management of livestock
- No disincentive for excessive use of water and electricity
- Quality concern of farm inputs

3.4 Opportunities

- Suitable agro climatic conditions for diversification within rice-wheat cropping pattern.
- Mechanization to solve the problem of labour
- Scope for recycling of organic waste and improvement in soil health
- Scope for diversification in favour of dairy based farming systems
- Creation of subsidiary occupation to solve the problem of unemployment
- Skill and knowledge upgradation through vocational training
- Improving information and communication technology (ICT) for real time extension
- Establishment of commodity based and /or technology based farmers association
- Improving the linkages and synergies with private sector, NGOs and other public sector organizations
- Multidisciplinary and farmers participatory approach to find solution for site specific problems/issues
- Creation of network of custom hire services
- Processed food and milk products to support retail marketing

- State designated certifying agencies for specific food items like organic products

3.5 Threats

- Disenchantment among young farmers towards agriculture as an occupation
- Lack of incentives towards dairying and subsidiary occupations
- Unscientific and un-decomposed farm yard manure and organic farm waste management
- Overexploitation of ground water for irrigation
- Breeding problems in milch animals associated with mineral deficiencies
- Higher calf mortality
- Decreasing availability of green fodder
- Shifting of productive land to non agriculture use

3.6 Analysis of low productivity of different crops in District Kurukshetra

3.6.1 Rice

- Varietal fatigue
- Non availability of public sector rice hybrids
- Low plant population
- Low water and nutrient use efficiency
- Indiscriminate use of pesticides
- Less awareness about IPM, INM and IWM

3.6.2 Wheat

- Varietal fatigue
- Lack of micro leveling of fields
- Poor organic carbon and low fertility of soil
- In proper irrigation scheduling and poor management
- Poor weed management and fear of herbicide resistance.

3.6.3 Sugarcane

- Lack of high yielding disease resistant varieties
- Poor availability of seed
- Poor management of ratoon

- Lack of value addition (inter cropping)
- Poor adoption of IPM practices

3.6.4 Sunflower

- Lack of high yielding hybrids and quality seed
- Non application of sulphur fertilizers
- Fluctuating market prices

3.6.5 Potato

- Lack of high yielding disease resistant varieties
- Poor availability of quality seed
- Poor adoption of IPM practices
- Lack of grading and storage facilities
- Fluctuating market prices

3.6.6 Horticulture Crops

- Poor planting material for fruits crops
- Non availability of hybrids from public sector
- Poor marketing infrastructure
- Fluctuating market prices
- Prone to frost during winter

3.6.7 Livestock

- Poor breeds in cow and buffaloes
- Lack of concentrates and mineral mixture in feed
- Poor management in space
- Insufficient animal health services

CHAPTER-IV

DEVELOPMENT OF AGRICULTURE SECTOR

4.1 Introduction

Agriculture is the backbone of the district as there are no industries to provide rural as well as urban employment. The majority of the population is engaged in agriculture. The major crops of the district are rice and wheat. The introduction of modern varieties of wheat and rice in 1960s and 70s changed the agricultural land scape of the district of the district considerably with diversified cropping system in 60s to predominatly rice-wheat system now. The use of fertilizers and improved irrigation facilities improved the cropping intisty to almost 198%. The increase in the use of fertilizer, irrigation and now pesticiudes have led to increased cost of cultivation and second generation problem discussed in chapter-II and III. The chalange now is to increase the growth rate in the productivity of crops and reduction in the cost of cultivation and use of natural resources at the same time. The production share of distt. Kurukshetra in the state for rice, wheat and sugarcane is 15.5, 5.1 and 11.1 percent, respectively. The present status of different crops is given in. Rice-wheat cropping pattern is predominant because of 100% irrigation facilities.

4.2 Land use

There is 151000 ha area under cultivation of different crops. The percentage of net area sown to total cultivable area is 99.3. Rice, wheat, sugarcane and sunflower are the major crops grown in the district. The area under different agricultural crops is given in Table.

Table 2 : Present status of different crops in distt. Kurukshetra (Year 2006-07)

S.No.	Crop	Area (000ha)	Production (000 tonnes)	Productivity (kg/ha)
1.	Rice	109	440	4038
2.	Wheat	110	514	4672
3.	Sugarcane	15	103	6894
4.	Sunflower	4.2	6.4	1515

4.3 Soil Health

The soil health of the district is of medium fertility. As per the soil health indices 86% soil is low and 14% is medium in per cent organic carbon. Similar trend is for available phosphorus (93% low and 7% medium in available phosphorous). The potassium status of soil is better than organic carbon and phosphorus. In respect of available potash, 55.7% soils are under medium category and 44.3% soil are under high category indicating depletion of available potassium also in future.

4.4 Water Resource & Management

4.4.1 Irrigation

The area under irrigation to net sown area is 100% as against the state average of 83.7%. The irrigation intensity of the district is 184.7 as against the state average of 184.6. Due to predominance of rice-wheat cropping pattern and dependence on ground water for irrigation, the whole district is categorized as 'over exploited' for ground water resource. There are 37251 tubewells and pumping sets in the district to irrigate the land under agriculture which are run by electricity. All the tubewells are submersible to extract water from deeper water aquifers thereby consuming more electricity. The water table has gone down to 27 metres and even more. As per GEC-97 methodology, the district is categorized as

<u>Category</u>	<u>Ground water development state</u>
Over exploited	> 100%
Critical	between 90% to 100%
Semi-critical	between 70% to 90%
Safe	< 70%

The ground water viability for future irrigation development is on negative side for the whole district. The water availability and future scope of underground water for irrigation purpose is shown in Table-9

Table 3 : Underground water status in district Kurukshetra

Block	Net Ground Water Availability (in Ha. M)	Allocation for Industrial / Domestic use (in Ha. M)	Existing G.W. Discharge for irrigation (in Ha. M)	G.W. Availability for future Irrigation Dev. (in Ha. M)	Present stage of G.W. Development %	Category of Block
Babain	3411	294	5709	- 2592	176	Over-exploited
Ladwa	3981	284	8000	- 4303	208	Over-exploited
Pehowa	12959	888	22683	- 10612	180	Over-exploited
Shahabad	8692	662	9587	-1557	118	Over-exploited
Thanesar	11395	820	18217	-7642	167	Over-exploited

4.4.2 Scope for improvement in irrigation

There is need of awareness among the farmers for adopting water saving techniques as proposed in resource conservation earlier. The micro irrigation systems like drip and sprinkler irrigation should be popularized. Although a centrally sponsored scheme namely “National Micro Irrigation Project” has been implemented w.e.f. 1.4.2006 to promote micro-irrigation in the district. In order to recharge the ground water, rain water harvesting is necessary as there is about 700 mm annual rainfall in the district. The focus should be on water saving techniques like irrigation at critical stages of crop growth, land leveling, green manuring and bed planting. These are ways to decreased conveyance losses by introducing folding plastic pipes, pucca channels and sub-surface pipe lines.

Table 4 : Proposal for water management in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demonstration (Deficit irrigation in rice)	10	1.0	10	1.0	10	1.0	10	1.0	10	1.0	5.0
Demonstration (More area under basmati to save water)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Folding pipes	5000	175	5000	175	5000	175	5000	175	5000	175	-
Subsidy 50%	-	87.5	-	87.5	-	87.5	-	87.5	-	87.5	437.5
Under ground pipes for irrigation (one acre length)	2000	1000	2000	1000	2000	1000	2000	1000	2000	1000	-
Subsidy 75%	-	750	-	750	-	750	-	750	-	750	3750
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	839.5	-	839.5	-	839.5	-	839.5	-	839.5	4197.5

4.5 Major crops and varieties in the district.

Rice, wheat, sugarcane, sunflower and forage crops (berseem and sorghum) are the major crops of the district. There is 100% area of wheat and about 68% area of rice under high yielding varieties. Similarly, the area of sunflower is also 100% under high yield private sector hybrids concerned with. The main hybrids of sunflower under cultivation are Mahyco-8, Mahyco-51, Jawala Mukhi, Divyamukhi, Pioneer 6460, Prosen-9 and NSFH-36. The varieties of sorghum also belongs to private sector and the lone variety of berseem grown in the distt. mascavi belong to public sector. The major varieties of sugarcane are COS 8436, COH-119, COS-767, COJ-64, CO-7717 and COH-99.

The spectrum of varieties of rice and wheat grown in the district are given below as per the survey conducted during the years 2005 to 2007 (Lathwal *et a*,2008)

Table 5 : Spectrum of rice varieties and hybrids (H) grown by farmers in district Kurkshetra

Year	Dwarf varieties	Dwarf hybrids	Basmati varieties
2005	HKR-126, HKR-127, Haryana Gaurav, Pusa-44, Govinda, PR-112, PR-113, PR-114, PR-118, PR-119	H-71, H-6444, H-6129, H-6111, H-257, H-832, H-801, H-Sonata, H-359, H-401	HBC-19, CSR-30, PB-I, Sarbati, RH-10, Pusa-1121, Sabnam
2006	HKR-126, HKR-127, HKR-47 Haryana Gaurav, Pusa-44, PR-106, PR-111, PR-112, PR-113, PR-114, PR-116 PR-118, PR-119, Govinda	H-71, H-6444, H-6111, H-6129, H-257, H-832, H-140, H-5151, H-9433, H-Sona, H-999, H-Samarat	HBC-119, CSR-30, PB-I, Sarbati, RH-10, Pusa-1121, Sabnam
2007	HKR-47, HKR-127, HKR-126, Pusa-44, PR-103, PR-110, PR-111, PR-112, PR-113, PR-118, PR-119, PR-201, S-140, SS-49, Govinda	P-71, H-6444, H-6129, Uro-36, H-999, US-312, H-9433, Dhoom-I, H-257, H-EXI, H-502, H-PUL, H-5151, H-857, H-9334, H-832, H-810, H-748, N-9394, H-26P26, H-25P25, H744, H-Prithvi, H-464	CSR-30, PB-I, HBC-19, B-370, Pusa-1121, Sarbati, Sabnam, RH-10, Pepsi, Pusa-1401, Royal Bhog

Table 6 : Spectrum of wheat varieties grown by farmers in district Kurukshetra

Years	Varieties
2005-06	PBW-343, PBW-502, WH-711, WH-542, HD-2329, HD-2687, HD-2733, WH-147
2006-07	PBW-343, PBW-502, PBW-373, WH-711, WH-542, HD-2687, HD-2733, Raj-3765

4.6 Input management

The major input used in different crops are seed, fertilizers and pesticides.

4.6.1 Seed

The area under rice and wheat constitutes about 74 percent of total cultivable area. At present the seed replacement rate (SRR) of wheat and rice is 32 and 70%, respectively. Thus, the scope of SRR is ambient in future to enhance the productivity of rice and wheat in the district.

4.6.2 Fertilizers

The adoption pattern of different nutrients (year 2007) in rice and wheat based on the survey conducted is given below:-

Table 7 : Present status and projections of fertilizers for XI Plan

Fertilizers	Used in 2006-07 (tones)	Projections in XI Plan (tones)					Total (tones)
		2007-08	2008-09	2009-10	2010-11	2011-12	
Urea	127021	131441	131461	131635	132450	133650	660637
DAP	34487	36566	36630	36805	37090	37535	184626
MOP	3037	5535	5545	5625	5920	6170	28795
SSP	3688	4676	4700	4760	4875	4960	23971
Total complexes	253	94	-	-	-	-	-
Total mixtures	3847	3893	4055	4515	4750	4925	22138

Table 8 : Adoption pattern of nutrients (kg/ha-1) in rice in district Kurukshetra during the year 2007.

Type of rice	Farmers who used K				Farmers who used as well as not used K			
	N	P ₂ O ₅	K ₂ O	ZnSO ₄	N	P ₂ O ₅	K ₂ O	ZnSO ₄
Dwarf varieties (Medium duration)	155.5	41.5	47.0	26.0	155.5	24.0	12.4	21.9
Dwarf varieties (short duration)	146.8	47.8	37.5	25.0	146.8	33.3	6.5	21.7
Dwarf hybrids	130.8	46.8	47.9	24.2	130.8	38.6	12.4	20.2
Basmati varieties	100.9	45.8	49.3	24.4	100.9	35.0	9.3	19.3
Overall average (Rice)	123.2	45.8	47.7	24.6	123.2	34.3	10.7	20.2

Table 9 : Ratio of nutrients used in rice in district Kurukshetra during the year 2007

Type of rice	Farmers who used K			Farmers who used as well as not used K		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Dwarf varieties (Medium duration)	3.31	0.88	1.0	12.6	1.9	1.0
Dwarf varieties (short duration)	3.91	1.27	1.0	22.5	5.1	1.0
Dwarf hybrids	2.73	0.98	1.0	10.6	3.1	1.0
Basmati varieties	2.05	0.93	1.0	10.8	3.8	1.0
Overall average (Rice)	2.58	0.96	1.0	11.5	3.2	1.0

Table 10 : Adoption pattern of nutrients (kg/ha⁻¹) and their ratio in wheat in district Kurukshetra during the year 2007

Description	Farmers who used K			Farmers who used as well as not used K		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Quantity of nutrients	158.1	58.2	37.5	158.1	56.8	7.0
Ratio	4.22	1.55	1.00	22.5	8.1	1.0

Table 11 : Adoption pattern of nutrients (kg/ha⁻¹) and their ratio in rice-wheat in district Kurukshetra during the year 2007

Description	Farmers who used K			Farmers who used as well as not used K		
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O
Nutrients (Rice+Wheat)	281.3	104	85.2	281.3	91.1	17.7
Ratio (Rice+Wheat)	3.30	1.22	1.00	15.9	5.1	1.0

4.6.3 Pesticides

The quantity of different pesticides (insecticides, fungicides and herbicides) used by farmers in different crops were 406.6 tonnes during the year 2006-07.

Table 12 : Present status and projections of pesticides for XI Plan

Pesticides Blocks	Used in 2006-07 (tonnes)	Pesticides in XI Plan (tonnes)					Total (tonnes)
		2007-08	2008-09	2009-10	2010-11	2011-12	
Thanesar	130.6	133.5	133.0	133.5	134.0	133.0	667.0
Ladwa	36.8	38.4	39.0	39.5	39.5	39.0	195.4
Babain	28.4	29.8	30.0	30.5	31.0	31.0	152.3
Shahaba	84.2	87.6	88.0	88.5	89.0	89.0	442.1
Pehowa	126.5	129.3	129.0	130.0	130.5	130.0	648.8
Total	406.6	418.6	419.0	422.0	424.0	422.0	2105.6

4.7 Farm Mechanization/Farm equipment

Farm Mechanization

Farm mechanization has been helpful in improving productivity of different crops, time saving, reducing drudgery, timely farm operations, resource conservation and protection from natural calamities. The timely sowing of wheat due to zero tillage seed cum fertilizer drills has improved the productivity of wheat during the years 2006 to 2008 which is remarkable achievement in wheat production. Placement of fertilizers under drill sowing results in higher nutrient use efficiency and likewise higher irrigation efficiency under bed planting and laser leveling. Use of crop harvesting machines ensures early completion of harvesting and threshing works which escapes the untimely rainfall and storms hazards particularly in wheat, rice and potato crops. Though under govt. of India Macro Management Mode of Agriculture during the year 2006-07, the subsidy was provided for 180 zero drills, 173 rotavators, 155 potato planters, 48 potato diggers, 95 straw reapers, 3 reaper binders and 1 power tiller in district Kurukshetra.

Apart from above there is need to create more awareness among farmers in respect of proper use of farm machines for higher efficiency saving human and energy resources.

Table 13 : Proposal for mechanization in agriculture In XI Plan

Machines	2007-08		2008-09		2009-10		2010-11		2011-12		Total Fin.
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	
Reapers	50	50	50	50	50	55	50	55	50	55	-
Subsidy (50%)	-	25	-	25	-	27.5	-	27.5	-	27.5	132.5
Reaper Binder	5	17.5	5	17.5	5	17.5	5	20	5	20	-
Subsidy (50%)	-	8.75	-	8.75	-	8.75	-	10	-	10	46.25
Potato Planter	50	10	50	10	50	12	50	12	50	12	-
Subsidy (50%)	-	5	-	5	-	6	-	6	-	6	28.0
Potato Digger	50	12.5	50	12.5	50	12.5	50	15	50	15	-
Subsidy (50%)	-	6.25	-	6.25	-	6.25	-	7.5	-	7.5	33.75
Total		45.0	-	45.0	-	48.5		51.0		51.0	240.5

4.8 Special projects / programmes on going in the district

The following special projects are on going in the district.

- Agriculture Technology Management Agency (ATMA) programme is being implemented since 2007-08 to strengthen the present extension system.

- b) Since 2004-05 the integrated scheme of oilseeds, pulses, oil palm & maize (ISOPOM) is being implemented in the district.
- c) Since 2006-07 the Macro management Mode of Agriculture is also being implemented to strengthen the mechanization in agriculture in the district.
- d) A small scheme viz front line demonstration on oilseed and pulses is being implemented through ICAR in Krishi Vigyan Kendra Kurukshetra.

4.9 Constraint Analysis

4.9.1 Yield gap analysis of major crops with reasons.

There are 2 to 14.8 % yield gaps in various crops grower in the district. The yield gap for rice, wheat and sunflower in the district were 8.2 and 14.8%, respectively. The main reasons of yield gap in wheat were herbicide resistance, less SRR (32%) delayed sowing, improper water management. Similarly in case of rice the yield gaps were due to low plant population per unit area, decreased water and nutrient use efficiency, less awareness about IPM, INM and IWM, non availability of public sector hybrids leading to confusion among farmers regarding proliferation private sector hybrids.

The major yield gaps in sugarcane were observed due to non-availability of early varieties, poor seed replacement, poor management of ratoon and less adoption of IPM practices. Frost also affected the during the year 2007-08. Comparatively poor performance of sunflower was due to lack of quality seed of high yielding hybrids all belonging to private sector. Similar to rice, the farmers were at a loss to select sunflower hybrids due to non-occurrence of public sector hybrids. Non-application of sulfur fertilizers, wrong method of sowing (broadcast) and late sowing of sunflower coinciding the maturity of crop with onset of pre monsoon rains affecting the harvesting of sunlower.

The major constraint in spreading of pulses in the district is lack of competitiveness with rice and wheat in terms of net returns. Heavy soils receding root proliferation for aeration hinders the pulse production in the district. Though summer moong is gaining impetus in rice-wheat cropping system, there is need of high yielding short duration variety to fit in the rice-wheat system.

4.9.2 Sustainability issues and gap analysis of productivity of different crops and resources

GAP ANALYSIS

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
A.	<i>Wheat</i>					
1.	Timely seeding of wheat	Delayed harvesting of Basmati rice, cotton, availability of irrigation, excess/untimely rains	Zero tillage, short duration varieties of rice, reduced duration of Basmati rice, direct seeding of Basmati,	Research, extension and development agencies should jointly approach in a farmers' participatory approach for each of possible solution. Evaluating and refining the technology for a range of stubbles, developing guidelines for achieving good establishment with residue retention, efficient use of N fertilizer. The technology meet to be further developed for other cropping systems and other crops. Testing of novel seeders in preparation for its commercialization e.g. Happy seeders.	1.1 lac ha upto 10 th Nov. areas to be covered include whole coarse rice and 50% Basmati rice,..	Zero tillage will help : a) Improving soil health including soil biology b) Improved environment c) Less water use d) More productivity e) Less problem of <i>P. minor</i> & decreased use of herbicides f) Reduced cost of cultivation g) Facilitates sowing under high soil moisture conditions
2.	Seed treatment	Termites, fungal diseases like loose smut, flag smut and Karnal bunt	Seed treatment with insecticides, fungicides and bio-fertilizers. Seed priming if sowing is delayed	Awareness of farmers regarding importance of seed treatment by the University and the State Department of Agriculture	Whole district covering rice – wheat cropping system	Productivity growth on sustainable basis

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
3.	Nutrient mining & increased incidence of multiple nutrient deficiencies	In RWCS, average N ranges from 160-180 kg/ha and average P use is 57 kg/ha. Recommendation is 5:2:1 not 4:2:1	Introduce more organic manures, more residue retention on surface, use of site specific micro-nutrient, use of N in three splits and use of first split before 1 st irrigation, integrate conjunctive use of organic and inorganic sources of nutrients generate fertilizer recommendations based on the principle of site specific nutrient management. The optimal use of existing (indigenous) nutrients coming from soil, organic amendments, crop residue and irrigation water. Apply fertilizer to fill the deficit between crop needs and indigenous supply. Management of pest diseases and weed problems through more appropriate nutrient management.	Experimental research in different cropping systems, relook at soil test values, change in the recommendation of practice	Whole rice-wheat cropping system,.	The residue retention will help improving soil productivity, improved water permeability, decreased losses of nutrients

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
4.	Varietal improvement	No variety to tolerate terminal heat, short duration variety produces less yield	Varieties with stay green character near maturity, long duration varieties, varieties which can fit early sowing starting from 15 th Oct. to manage terminal heat at maturity	Pre-breeding, work on hybrid wheat. Improvement in the grain size of WH 542	At least 75% area should be covered with varieties which can yield equal or more than WH 542 and PBW 343	More enhanced use of natural resources
5	Weed management	<ul style="list-style-type: none"> ❖ <i>Phalaris minor</i> seriously affects wheat yields in rice-wheat cropping system. ❖ Complex wheat flora seriously affects wheat yield in non-rice wheat cropping system. ❖ Phalaris resistance will be come a major problem and needs immediate attention for ecological solution. We must delay or avoid resistance. 	<ul style="list-style-type: none"> ❖ Improve the efficiency of existing herbicides. ❖ Introduce new herbicides. ❖ Capacity building for spraying techniques. ❖ Ecological approached including zero-tillage crop rotation. ❖ Monitoring of resistance build up. ❖ Germplasm management for competitive varieties 	Strategic plan for the management of <i>Phalaris minor</i> integrated. Capacity building of extension agencies and farmers for appropriate spraying techniques. On farm demonstrations of new herbicides	Whole district	Anticipated economic benefits are increased profitability, increased yield and increased food security.

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
B.	Rice					
1.	Hybrids	Less number of hybrids in Basmati group, lodging in coarse rice hybrids	Increase area under hybrids in coarse rice.	Should concentrate on evolving hybrids for Basmati rice	50% area of coarse rice should come under hybrids	Due to fear of lodging farmers use less N which is good for sustainability
2.	Low plant density	Drudgery of transplanting operation, hired labour, non-availability of labour	Introduction of paddy transplanter under zero-tillage and/or under unpuddled situations, direct seeding in unpuddled situation, varieties that can compete with weeds under direct seeding.	Farmers' participatory approach for evolving crop establishment techniques, availability of paddy transplanter, custom hire services for raising nursery	5% growth in area under paddy transplanter in next two years. Similarly 5% growth in area in direct seeded Basmati rice	Improvement in soil physical conditions, better soil health, less water use, less drudgery of labour, better yield of wheat after rice due to unpuddled situation or improvement in soil physical conditions
C.	Sugarcane					
	Late planting	Fields vacated by wheat	Encouraging farmers for autumn planting	Training and demonstrations on autumn planting	At least 20% planting of cane should be under autumn planting and intercropping with wheat and other crops.	Increase productivity and multiple land use
D	Green manuring	Shortage of varieties for summer moong, shortage of quality seed of Sesbania	Introduce summer moong immediately after wheat harvest even under zero tillage situations, evolving varieties for summer moong with synchronized maturity.	Farmers' participatory approach and KVK farmers	Whole Basmati rice area and 50% coarse rice	Improvement in soil health, soil organic matter, integrates mechanization, better fertilizer use efficiency, less water use in some situations

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
E	Decline in soil organic carbon	Coarse textured soils with high pH, faster microbial degradation, excess puddling, low moisture and high temperature in summer, cultivation of summer rice	Introduction of summer moong, enhanced use of FYM, green manure, promote 50% area under Basmati rice, use of leaf colour charts, slow-release fertilizers	Long-term trials to study soil organic carbon and fractionation of organic matter, INM	Whole Basmati area and maximum area of coarse rice	Improved organic carbon content
F.	Declining water table	More area under summer rice, transplanting before the onset of monsoons, continuous flooding, pan formation and puddling reduces percolation of water	Avoid early transplanting, introduction of mechanical transplanter, irrigation at hair line crack formation or use of tensiometers for irrigation scheduling, avoid puddling	Both types of research involving cropping system at research farms and at farmers' fields	In the whole district water table is depleting at an alarming rate.	Improvement in water table
G	<i>Diversification</i>					
1.	Reduced bio-diversity due to large area under monocultures without legumes	High risk associated with legume crops, more insect-pest problems in pulses, availability of high yielding varieties of crops other than pulses	Develop alternate strategy to introduce summer moong in the multiple land use system	Out source varieties of moong bean that fit in the summer cultivation between rice and wheat	20% area of coarse rice and whole area of Basmati rice	Improvement in soil health and savings in water
2.	Intercropping of sugarcane with wheat and other crops like vegetables	Lack of mechanized crop establishment	Use of bed planters for autumn sugarcane based intercropping of wheat and its intercrop with other vegetables	Farmers' participatory approach	Whole sugarcane area planted after wheat harvest can be brought forward for autumn planting and intercropping	More conservation of resources, multiple land use, getting more with less investment

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
H	<i>Water management</i>					
1.	Reduced water use efficiency	Poor rain and irrigation water management, poor land levelling, low power tariff, supply driven irrigation system, summer rice	Shifting transplanting to mid June, intermittent ponding, introduction of zero tillage, bed planting, laser land levelling and green manuring, improvement in percolation rate, introduction of micro-irrigation, water harvesting irrigation and canal operation schedules	Demonstrations, development and research	Whole district	Savings in water, improved water use efficiency, better water-nutrient interactions
I	<i>Integrated pest management</i>					
1.	Weed management in wheat	Development of resistance in <i>P. minor</i> , cross resistance	Accelerated adoption of zero tillage, mechanized weeding using bed planting system, more competitive varieties, bringing 10% area at each farm level under alternate crops, rotation of herbicides of different chemistries, introduction of sunflower	Basic research on the mode and genetics of resistance, release of competitive varieties, monitoring of resistance development	Whole RWCS and other cropping systems adjoining RWCS	Sustained productivity of wheat, reduction in herbicide use, better use of natural resources
3.	Emergence of new pests	Availability of monoculture systems and intensive cropping	Intensive research on crop ecology and biological control, research on bio-technology	Basic research on ecology, biological control	Whole district	Avoid emergence of new pest problems and reduction in pesticide use

S. N.	Gap	Factors/constraints leading to gaps	Strategies	Approach and methodology	Performance indicators	Sustainability outputs
J	<i>Vegetables</i>					
1.	New management strategies among small holders vegetable farmers	Availability of hybrid seeds, cost of hybrid seeds, availability of low water requiring vegetable varieties, intercropping of vegetables and multiple land use, vegetable based cropping system with intervening cultivation of flowers, sugarcane based intercropping of vegetables	Supply and quality of hybrid seed, marketing enhancement of vegetables, improved germplasm for garlic and onion, management of apical virus in potato	Improved germplasm research, farmers' participatory research on intercropping, technical and market information from different sources to farmers, relaying of production information from farmers to researchers, physical infrastructure for grading, processing and storage, electricity charges on the basis of agriculture for small unorganized food processors and mushroom growers	Special emphasis of vegetable based infrastructure	Will help diversifying agriculture for transforming the system into income generating activities through improved productivity and marketing
K	<i>Sunflower</i>					
1.	Hybrids	Non availability of public sector hybrids and confusion with private sector hybrids	Development of public sector hybrids	Linkages and synergies with private sector for testing at farmers fields.	Whole area after potato and some area after early harvested sugarcane	Increased productivity and maturity before onset of monsoon.

4.9.3 Research/Extension/Adoption gaps

Varietal fatigue is the major research gap in all the crops. There is need of high yielding pests resistant varieties for replacement as a particular variety with the passage of time tends to loose its production potential and disease resistance. Hybrids of rice and sunflower need attention as the area under hybrids is tremendously increasing which is desirable even to improve productivity.

Due to dearth of extension human resource, the spread technology is not upto the mark. The farmers are more in contact with commission agents and pesticide dealers for credit, borrowing of inputs and technological know-how. There exists a parallel private extension system guiding the farmers about private sector input delivery system.

4.9.4 Processing/Storage/Marketing gaps

There is a good marketing network for disposal for farm outputs. The farmers are unable to keep the produce for storage due to their poor financial status and over dependent upon commission agents. Processing facilities of rice and sugarcane are available in the district and there seems to be no constraint in this case.

4.9.5 Existing Institutional Mechanism in the Government sector

As per above mentioned facts about the role of private sector in input supply, the supply of the input through institutional arrangement is not sufficient. The farmers are not sure about the quality of inputs supplied by private sector. The cooperatives role needs to be enhanced at village level to meet the input requirement .

4.9.6 Income analysis of various categories of farmers

Though a systematic study on income of various categories of farmers is not available due to poor response of farmers in providing financial information for the fear of tax imposition,

withdrawal of subsidies and credit facilities. Nevertheless, the majority of farmers are small and marginal having income for their subsistence. The farmers have low risk bearing capacity and investment.

4.10 Recommended interventions for the district with detailed action Plan with costs.

As discussed at Sr. No. 4.9.1 and (yield gap analysis) the following interventions are required to bridge the technological gaps for enhanced productivity.

4.10.1 : ACTIVITY OUTPUT MATRIX FOR AGRICULTURE SECTOR IN DISTRICT KURKSHETRA				
Issues	Programmes	Activities	Collaborators/Targets	Cost (Rs.)
1. Seed production	1. Seed planning	Participatory selection of improved variety at farmers field. 2 motivating. farmers to produce the seed of best variety 3. Surveying the yield performance of varieties/hybrids in each crop. 4. Presenting data of best performed variety. 5. Deleting varieties/hybrids with low yields in any current season. 6. Mandatory testing of new variety hybrids through KVK's.	DDA's for serial no. 1 2, and 5 KVK's for 3, 4 and 6 Data for all activities will be presented in the officers workshop	<ul style="list-style-type: none"> • 40 ha per year will be undertaken (40x5x5000=10 lakh). • Monitoring 50,000 per crop. • (50,000x3x5= 7.5 lakh)
	3. Seed treatment	1. Chemical treatment and .non-chemical treatment 2. Capacity building resource person/extension agencies/seed companies	DDA/HSDC KVK	100X5=500 lakhs 10 lakh
2. RCT (i) Zero-tillage	Environmental (Carbon sequestration, soil fertility gains etc.) and economic benefits (saving in labor, diesel, machinery wear and tear etc) will be catalogued and calculated. Zero till technology will be extended to wheat in other cropping system and other crops including rice,	Monitoring of farms where farmers have practiced zero-tillage for more than five years. (10 ha) KVKs & Scientist from main campus/research station.	Demonstration and long term trials will be laid out by KVKs at farmer's field. DDAs will ensure visit of farmers at demonstration sites.	Demonstration 10x5x5000=2.5 lacs Zero Tillage Machines 50x25000x5=62.5lacs 50% subsidy 62.5/2 =31.25 lacs

(ii) Bed Planting	<p>sorghum, maize and pulses.</p> <ul style="list-style-type: none"> ❖ Assemble district level data and use them for bio-physical and socio-economic characterization using GIS. ❖ Evaluate the concept for ecological intensification of cereal systems. ❖ Improve agronomic efficiency of nutrients. ❖ Improve recovery efficiency of nitrogen ❖ Improve crop water productivity and irrigation water productivity for a system as a whole ❖ Improve biological activity in the soil. ❖ Reduce energy budget for rice-wheat cropping system. <p>The rate of soil organic matter (increase and anticipated environmental benefit including improved</p>	<p>KVKs & Scientist from main campus/research station.</p> <p>DDAs & KVK</p> <p>Dual purpose virtues of technology will be demonstrated in inter-cropping based system approach through University and State department.(10ha)</p>	<p>KVKs & DDAs</p>	<p>Exposure visit = 2.5 lacs</p> <p>250 units with 50% subsidy on machines to be bought by the farmers. 250x25000= 62.5 lacs</p>
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	<p>soil fertility, soil structure and reduced leaching of N will be targeted)</p> <ul style="list-style-type: none"> ❖ Technical and financial constraints will be studied to arrive at impediments that stand in the way of adoption of bed planting. ❖ New scientific knowledge of its success in water log situation will be evaluated. ❖ System level integration through multiple land use will be evaluated and accelerated to get full benefit from this technology. ❖ This system will follow different pathways for system-level changes leading to ecological intensification through inter-cropping. ❖ Will target, high yields, high profits and high resource 			
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(iii) Direct Seeding	<p>efficiency (water, energy, nutrients, labour through improved management solutions).</p> <p>❖ Permanent raised bed system would be evaluated to arrest rate of ground water decline due to less use of ground water.</p> <p>Switching from rice-wheat cropping system to multiple land use system with sugarcane, vegetables will be evaluated for their potential for less use of ground water.</p> <p>Direct seeded rice, direct seeding by zero-tillage machine, direct seeding by drum seeder under wet situation. Green manuring immediately after wheat harvest, brown manuring by retaining residues and then seeding with machine, use of hybrids under direct</p>	<p>KVKs and DDAs will lay out demonstrations on basmati rice. Demonstrations include direct seeding dry seeded and direct seeding wet seeded. Dry seeding will be done by machine while wet seeding will be done by drum. (4 ha)</p>	<p>KVK & DDAs</p>	<p>40 ha demonstrations every year = 2.5 lacs</p>
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	<p>seeded rice, decrease in maturity period, saving in water. Direct seeding will alleviate labour problem, will save water. The purpose of this sub-programme is to develop strengthen based and farmers driven direct seeded technology in basmati rice. The window between wheat harvest and rice seeding will be utilize for green manuring and then retaining the residue on the surface.</p>			
(iv) Alternate wetting and drying	<p>1. Effect of switching from fluid to alternate wetting and drying method of irrigation for crop establishment on reduction in water use without effecting the productivity will be accessed.</p>	<p>DDAs will lay out demonstrations on coarse rice in each block. DDAs will also record data on water saving. The yield penalty if any will be recorded while recording data on yield.</p>	<p>DDAs</p>	<p>Demonstrations 100x5000x5= 25.0 lacs</p>
(v) Laser – Leveling	<p>Laser land leveling for water saving, land saving and improve yields in rice, wheat and sugarcane.</p>	<p>DDAs will organize and monitor the distribution of laser leveler specially on custom hire services. Data on water saving and yield will be recorded. The data will be discussed in joint meeting</p>	<p>DDAs & KVKs</p>	<p>Laser Levelers 200 units at 50% subsidy = 480 lacs</p>

		<p>of KVK and DDAs. The presentation of data finalized in the meeting will be made by DDAs.</p> <p>DDAs will also ensure the exposure visit of farmers on sites already demonstrated by KVKs.</p> <p>Two way subsidy may be given farmers who are using custom hire services, may be given subsidy on the charges on hour basis. The service provider can be given subsidy if it is passed on to the user farmers.</p>		<p>Demonstration 10 hax 5000x5=2.5 lacs</p>
(v) Green manuring	<p>The improvement in the productivity of crops</p> <p>Improvement in the soil health.</p>	<p>DDAs will ensure the timely availability of dhaincha seed at 75% subsidy. 50 per cent area will be covered during the plan period of five years.</p>	DDA	<p>10000hax500x5 = 250 lac 187.5 lac at 75% subsidy</p>
(vi) Summer moong	<p>Introduction of summer moong in the rice-wheat cropping system to discourage summer rice.</p> <p>To ensure timely transplanting of rice and to sustain the productivity of summer moong, the sowing should be preferred up to 20th April.</p>	<p>DDAs will ensure the acceleration of the technology and timely availability of treated seed. The suitability of variety to be ensured through KVKs.</p> <p>Seed producing farmers may also be given incentives. Farmers producing summer moong for commercial purpose may be given incentive in the form of MSP and guaranteed procurement.</p>	<p>DDAs and KVKs</p> <p>Ten per cent area will be covered every year.</p> <p>HSDC/DDAs/HAFED/HLR DC</p>	<p>5000hax1500x5= 375 lacs/2 = 187.5 lacs (at 50% subsidy)</p>

<p>3. Water management (Depleting water table)</p>	<p>Deficit irrigation increase water use efficiency.</p> <p>Keeping 40-50 per cent area under basmati rice.</p> <p>Testing of high yielding basmati varieties.</p> <p>Folding pipes</p>	<p>Deficit irrigation for 15 days in July or August will be tested for coarse rice.</p> <p>Economics of basmati rice in favour of farmers will be ensured through technological interventions and policy frame work.</p> <p>Varieties for traditional basmati for yield improvement. The price incentive of a multiple of 1.6 for traditional basmati and 0.6 for coarse rice compared to prevailing price of evolved basmati rice in the region.</p> <p>Encouraging farmers for using folding pipes(one acre length)</p>	<p>KVKs & DDAs will jointly lay out demonstrations in ten hectares</p> <p>Agricultural Economist at KVKs or group of KVKs and concerned agronomist will prepare the data sheet on the profitability on different groups of varieties. Incentives on quantity of water saved or enhanced water productivity will be suggested.</p> <p>DDAs will demonstrate and KVKs will collect yield data on successful demonstrations.</p> <p>DDA</p>	<p>Demonstrations 10x5000x5= 2.5 lacs</p> <p>50000x5= 2.5 lacs For monitoring</p> <p>Demonstrations 10x5000x5= 2.5 lacs</p> <p>5000x3500x5=875 lacs for folding pipes Subsidy(50%)=437.5 lacs</p> <p>230 lacs for labs.</p>
<p>4. Site specific nutrient management</p>	<p>Number of split application and timing of top dress N with reference to irrigation</p>	<p>The project will identify, test and promote intervention for the sustainable rice-wheat cropping system through site specific nutrient management.</p>	<p>State level designated lab at Karnal may be strengthened Special provisions need to be made for creating regional level designated labs for quantifying micro-</p>	

		<p>Fertilizer recommendation will be based on the principles of SSNM. SSNM will include yield gap analysis, guidelines for regional protocol.</p> <p>Integrated soil and crop management for rehabilitation of pulse production in rice-wheat cropping system.</p> <p>Surface residue management for improving soil health.</p>	<p>nutrients deficiencies. (DDAs)</p> <p>Existing fertilizer use will be quantified on the basis of farmer's field survey. The ratio of NPK and quantity of each components currently use by farmers will be compared with recommended practices a t farmer's field. The data will be presented in officer's workshop for further research and/or recommendation. (DDAs)</p> <p>DDAs will ensure quality seed of important pulses for Kharif and Rabi seasons. The university will ensure recommendation of varieties tolerant to various types of biotic and abiotic stresses.</p> <p>Happy seeders and other machineries for uniform distribution of residue will be ensured by DDAs.</p> <p>Residue retention machinery, second generation machinery, precision and no-till</p>	<p>2 lacs x 5 = 10 lacs for survey</p> <p>10x5000x5=2.5 lacs 50 lacs for machinery</p>
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5. IPM	Bio-fertilizers	Improving the efficiency of nutrient utilization.	farming for crops and cropping system.	
	Management of bakane disease (Foot rot disease) through nursery management.	DDAs will demonstrate the recommended technologies at farmers field	DDAs	Demonstration 10 ha x 5x 5000 = 2.5 lac 10hax 5000x5= 2.5 lacs
	Management of Sheath blight through clean cultivation.	DDAs will organize farmer's field schools.	DDAs	10 field's schools x 5 x50000 = 25 lacs.
	Management of blast in basmati			
	Management of leaf folder, stem borer and white backed plant hopper (WBPH)	KVKs will suggest tolerant varieties.	KVKs	
	Biological control of pests in sugarcane.	Strengthening of bio-control lab.	DDAs	50 lacs
	Agronomic management of borers in sugarcane.	Plant clinic labs for KVKs	KVKs	50000x5= 2.5 lacs for survey and monitoring
	Quantification, characterization and management of resistance of key pests against insecticides in vegetables.	Strengthening of quality of pesticide lab of state department.	DDAs	
Diversification of wheat varieties against		DDAs/KVKs		

	rusts. Management of wheat aphids Bio-control lab for sugarcane		DDAs Sugar mill	10ha x5x5000= 2.5 lacs
		Bio-agents to control insects Demonstration of candidate varieties at farmer's field.	DDAs/KVKs	10ha x5x5000= 2.5 lacs
		Survey & demonstrations	DDAs/KVKs	50000x5=2.5 lacs
6. IWM	Spraying techniques for improving efficiency of herbicides. Monitoring of herbicide resistance.	Demonstrations Survey and demonstrations	DDAs/KVKs	10hax5x5000 = 2.5 lacs for demonstrations Spray booms 10000 x 250 = 25 lacs. 50000x5= 2.5 lacs for surveys
7. Timely seeding of wheat	Zero tillage, short duration varieties of rice, reduced duration of Basmati rice, direct seeding of Basmati	Research, extension and development agencies should jointly approach in a farmers' participatory approach for each of possible solution. Evaluating and refining the technology for a range of stubbles, developing guidelines for achieving good establishment with residue retention, efficient use of N fertilizer. The technology meet to be further developed for other cropping systems and other crops.	1.1 lac ha upto 10 th Nov. areas to be covered include whole coarse rice and 50% Basmati rice,	Campaigns, hoarding/posters, field days, district level training camps 5 lac x50=250 lacs

<p>8. Rice</p>	<p>Introduction of hybrids for both coarse and basmati rice. Fertilizer management in hybrid to avoid lodging and incidence of pest and diseases Mechanical transplanting to avoid labor problem.</p>	<p>Testing of novel seeders in preparation for its commercialization e.g. Happy seeders.</p> <p>DDA's, KVK's and concerned scientists from research will help in accelerating the adoption of hybrids or competing varieties of coarse rice and basmati. Revise the recommendation of fertilizer use for achieving target yields. Accelerated adoption of paddy transplanter and direct-seeded rice.</p> <p>DDAs will facilitate demonstrations on six niche areas proposed in column 2</p>	<p>DDA's and KVK's will jointly demonstrate the virtues of new technologies under the leadership of KVK scientists.</p> <p>Linkage and synergies with private sector will be developed for outsourcing hybrid seeds and/or developing MOU for seed production by securing parent lines.</p>	<p>40 ha x 5 x 5000 = 10 lakh</p> <p>40 ha x 5000 x 5 = 10 lakh (mechanical transplanter)</p> <p>10 ha x 5000 x 5 = 2.5 lakh (direct seeded rice)</p> <p>5 paddy transplanter = 10 lakh.</p> <p>50000 x 5 = 2.5 lakh for survey and monitoring</p>
<p>9. Sugarcane</p>	<p>Late planting after wheat harvesting, lack of mechanized planting, lack of varieties in early group</p> <p>Less use of potash</p>	<p>DDAs will facilitate autumn planting of whole sugarcane area planted after wheat harvesting, facilitate intercropping of Rabi crops with autumn sugarcane using bed planting, testing of early varieties through KVKs and sugarmill</p>	<p>DDAs, Cane commissioner, sugar mills and KVKs.</p>	<p>10 ha x 10000 x 5 = 5 lakh</p> <p>50 % subsidy on bed planter</p> <p>50 x 25000 = 12.5 lakh.</p>
<p>10. Other crops Sunflower</p>	<p>Quality seed of sunflower hybrid,</p>	<p>Linkages and synergies with private sector will be developed for availability of hybrid seed of sunflower..</p>	<p>DDAs will ensure the availability of quality seeds of sunflower hybrid..</p>	<p>5 ha x 5000 x 5 = 1.25 lakh</p>

4.10.2 Varietal improvement:

To increase the productivity of rice and sunflower, the testing of different hybrids is essential to develop the suitable package of practices for further dissemination. For this purpose trainings and demonstrations will be conducted at farmers fields. This will include the linkages and synergies with the public sector private sector, NGO's cooperatives. The technology will be outsourced wherever needed

Table 14 : Proposal for varietal/hybrid improvement in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demonstration on wheat (ha)	40	2	40	2	40	2	40	2	40	2	10
Demonstration on sunflower	5	0.25	5	0.25	5	0.25	5	0.25	5	0.25	1.25
Demonstration on rice	40	2	40	2	40	2	40	2	40	2	10
Monitoring by KVK	-	0.50	-	0.50	-	0.50	-	0.50	-	0.50	2.5
Seed treatment in wheat	-	100	-	100	-	100	-	100	-	100	500
Capacity building (KVK)	-	2	-	2	-	2	-	2	-	2	10
Exposure visit (DDA)	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	107.25	-	107.25	-	107.25	-	107.25	-	107.25	536.25

4.10.3 Resource Conservation Technology (RCTs)

Agriculture is entering a new transformation phase to ensure that past gains of conventional technology can be sustained and further, enhanced to feed the growing population. Productivity stagnation, deteriorating soil health and depleting water resources are the present day concerns of attention. Conservation agriculture has come up a new paradigm to maintain ecological equilibrium for cost effective regenerative processes like no-tillage, water and energy saving, nutrient recycling, soil regeneration and protection of natural enemies of pest and diseases. Such resource conservation technologies have proved boon to the farmers practiced in the district through farmers participatory approach.

Table 15 : Proposal for RCTS(rice) in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demons.(Direct seeding of rice)	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	2.5
Demons (Alternate wetting and drying in rice)	100	5	100	5	100	5	100	5	100	5	25.0
Capacity Building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	6.0	-	6.0	-	6.0	-	6.0	-	6.0	30.0

(A) Present status: Use of zero tillage drills

Table 16 : The status of zero tillage sowing of wheat and its monetary advantages

Years	No. of drills	Area of wheat (ha)	Increase in yield (%)	Monetary benefit in district (Rs. in crores)
1997-98	5	20	8.1	0.004
2000-01	30	14000	5.8	5.06
2005-06	2080	75000	8.4	31.93
2006-07	2688	78000	9.1	33.21

Table 17 : Proposal for zero tillage (ZT) in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demons. On ZT (> 5 years)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
ZT Machines	50	12.5	50	12.5	50	12.5	50	12.5	50	12.5	-
Subsidy 50%	50	6.25	50	6.25	50	6.25	50	6.25	50	6.25	31.25
Timely seeding Of wheat(campaigns, Hordings.postres, pamphlets etc.)	-	50.0	-	50.0	-	50.0	-	50.0	-	50.0	250.0
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	57.25	-	57.25	-	57.25	-	57.25	-	57.25	286.25

(B) Laser levelers for land leveling :

The water table in the district is going downward approximately 30 cm every year. The farmers participatory research has shown that use of laser leveler saves 25-30% water, increases grain yield by 15-20%, increase in area by 3-5% alongwith others invisible advantages. Thus this technology needs popularization.

Table 18 : Proposal for Laser leveler in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demons. on laser leveler	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Laser leveler	50	180	50	180	50	200	50	200	50	200	-
Subsidy 50%	50	90	50	90	50	100	50	100	50	100	480.0
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	91	-	91	-	101	-	101	-	101	485.0

(C) Bed planting

Showing of wheat with bed planter exhibits yield advantage and 21-24% higher water use efficiency. Thus the scarce available water can be efficiently converted into enhanced output. There are only two bed planters associated with public sector which are not sufficient even to demonstrate the technology.

Table 19 : Proposal for Bed planter in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demons. On Bed planter (Sugarcane)	10	1.0	10	1.0	10	1.0	10	1.0	10	1.0	5.0
Bed Planter	50	25	50	25	50	25	50	25	50	25	-
Subsidy 50%	50	12.5	50	12.5	50	12.5	50	12.5	50	12.5	62.5
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	14.0	-	14.0	-	14.0	-	14.0	-	14.0	70.0

(D) Green manuring with sesbania:

The organic matter status of soil is decreasing and atleast 0.4 per cent organic matter must be maintained to harvest good crop yields. Therefore, recycling of biological matter is of utmost importance and green manuring during summer in rice-wheat cropping system needs to be popularized.

Table 20 : Proposal for green manuring (Sesbania) in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Area (ha)	10000	-	10000	-	10000	-	10000	-	10000	-	-
Seed (quintals)	2500	-	2500	-	2500	-	2500	-	2500	-	-
Cost of seed	-	50	-	50	-	50	-	50	-	50	-
Subsidy (75%)	-	37.5	-	37.5	-	37.5	-	37.5	-	37.5	187.5
Total	-	37.5	-	37.5	-	37.5	-	37.5	-	37.5	187.5

(E) Bringing more area under summer moongbean:

Ground water resource is continuously depleting and district Kurukshetra has been declared as dark zone. In order to discourage the summer rice cultivation, moongbean (short duration varieties) must be encouraged for dual benefits (infusion of third crop and green manuring being leguminous crop). Mungbean will provide value addition to rice-wheat

cropping system. Further the productivity of rice improves grown after moongbean.

Table 21 : Proposal for summer moong in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Area (ha)	5000	-	5000	-	5000	-	5000	-	5000	-	-
Seed (quintals)	1250	-	1250	-	1250	-	1250	-	1250	-	-
Cost of seed	-	75	-	75	-	75	-	75	-	75	-
Subsidy (50%)	-	37.5	-	37.5	-	37.5	-	37.5	-	37.5	187.5
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	38.0	-	38.0	-	38.0	-	38.0	-	38.0	190.0

Table 22 : Proposal for water management in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demonstration (Deficit irrigation in rice)	10	1.0	10	1.0	10	1.0	10	1.0	10	1.0	5.0
Demonstration (More area under basmati to save water)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Folding pipes	5000	175	5000	175	5000	175	5000	175	5000	175	-
Subsidy 50%	-	87.5	-	87.5	-	87.5	-	87.5	-	87.5	437.5
Under ground pipes for irrigation (one acre length)	2000	1000	2000	1000	2000	1000	2000	1000	2000	1000	-
Subsidy 75%	-	750	-	750	-	750	-	750	-	750	3750
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	839.5	-	839.5	-	839.5	-	839.5	-	839.5	4197.5

4.11 Projected outcome and growth rate during the plan period:

The projected outcome of the proposed interventions given at Sr. No. 4.10 can be assessed by the Activity Output Matrix and the projections for XI Plan are given below in Table 23.

Table 23 : Projected outcome and growth rate (4%) for XI Plan of Main Crops in the District kurukshetra (Area –000 ha, Production – 000mt, productivity – kg/ha)

Sl. No.	Name of Crop	Normal 2004-05 to 2006-07			2007-08 (Projected)			2008-09 (Projected)			2009-10 (Projected)			2010-11 (Projected)			2011-12 (Projected)		
		Area (A)	Production (P)	Productivity (Y)	A	P	Y	A	P	Y	A	P	Y	A	P	Y	A	P	Y
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1)	Rice	111	440	4000	115	457.6	4160	115	475.9	4326.4	115	494.9	4499	115	515	4679	115	535	4866.6
2)	Wheat	110	495	4500	114	514.8	4680	114	535.4	4867.2	114	556.8	5062	114	579	5264	114	602	5474.9
3)	Sugarcane	15	105	7000	15	109.2	7280	15	113.5	7571.2	15	118.0	7874	15	123	8189	15	128	8516.5
4)	Sunflower	6	9	1500	8	12.0	1560	8	12.5	1622	8	13.0	1686	8	13.5	1753	8	14.0	1823

4.12 Research Issues

- (i) Development of varieties and hybrids of different crops.
- (ii) Strong linkages and synergies with private sector for hybrid development including outsourcing.
- (iii) Technology for recharging of under ground water resource.
- (iv) Suitable strategies for IPM.
- (v) Herbicide resistance in wheat.

4.12.1 Integrated pest management (IPM)

The insect, disease and weeds spectra are becoming wide over the years due to spread of non-recommended private sector crop hybrids prone to various biotic stress. Secondly, the indiscriminate use of non branded pesticides are creating the multifarious problems like resistance development against pests and environmental as well as ecological hazards. These issues needs to be addressed through IPM strategies to reduce the pesticide load on crops.

Table 24 : Proposal for IPM and IWM in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	
Demonstration on rice	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Survey on rice	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Demonstration on wheat (aphid)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Demonstration on wheat (Spray techniques)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Monitoring (Herbicide resistance)	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Spray Booms (wheat)	10000	25	5000	12.5	-	-	-	-	-	-	37.5
Survey on wheat	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Demons. On wheat (IWM)	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Bio-control lab (Sugarcane)	-	5.0	-	-	-	5.0	-	-	-	-	10
Pesticide lab	-	-	-	50	-	-	-	-	-	-	50
Farmer fields schools	10	5.0	10	5.0	10	5.0	10	5.0	10	5.0	25
Total	-	38.5	-	71.0	-	13.5	-	8.5	-	8.5	140.0

4.12.2 Integrated nutrient management (INM)

The soil health is towards a declining trend ultimately affecting the productivity of different crops. The status of organic carbon, phosphorus, potassium, zinc and sulfur indicates the imbalances of nutrients which need to be replenished for this purpose. Integrated nutrient management is essential to harvest production potentials of different crops.

Table 25 : Proposal for site specific nutrient management (SSNM) in agriculture in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
State level lab	-	-	-	200	-	10	-	10	-	10	230
Survey	-	2.0	-	2.0	-	2.0	-	2.0	-	2.0	10
Demonstration on residue management	10	0.5	10	0.5	10	0.5	10	0.5	10	0.5	2.5
Happy seeders	40	20	40	20	40	20	40	20	40	20	-
Subsidy (50%)	40	10	40	10	40	10	40	10	40	10	50
Capacity building (KVK)	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	13	-	213	-	23	-	23	-	23	295.

CHAPTER-V

Allied Agriculture Sectors

Horticulture, Animal Husbandry, Fisheries and Social Forestry are the allied sectors important in development of agriculture.

5.1 Horticulture Development

Horticulture is an important sector in agriculture. The agro climatic conditions of the district are congenial for growing fruit and vegetable crops. The major fruit crops grown in the district comprising mango, guava, peach, pear, chiku and papaya produced 5717 tonnes (2006-07) from an area of 946 ha. The major vegetable crops viz. potato, tomato, carrot, cauliflower, radish, onion, pea, chillies, brinjal, cucurbits and leafy vegetables in 13225 ha produced 143340 tonnes (2007-08). Besides this, spices grown in 540 ha had a production of 3070 tonnes. Floriculture in 110 ha with the production 505 tonnes of marigold and 155000 sticks of gladiolus. Mushroom is also an important enterprise grown as 43890 trays with the production of 234 tonnes. The data on present status of horticultural crops are given in Table 24, 25 and 26. National Horticulture Mission is being implemented from the year 2008-09 in district Kurukshetra.

5.1.1 Constraints analysis in horticulture

a) Productivity gap

Lack of good quality planting material for propagation of fruit plants and non availability of varieties and hybrids from public sector, poor marketing infrastructure, fluctuating market prices, lack of post harvest management technology and export facilities are the major constraints faced by farmers for fruits, vegetables and floriculture.

Potato is the major vegetable crop facing very low seed replacement rate (below 10%) which is in turn encouraging the spread of seed born diseases resulting in low productivity.

(b) Research/Extension/Adoption gap :

Lack of improved high yielding disease resistant varieties of vegetable crops the potato, onion, tomato and pea. There is scarce human resource for extension of horticultural crops. Thus the adoption of latest technology of these crops is not upto the mark.

(c) Processing/storage/Marketing gaps :

Fruits and vegetables are highly perishable which cannot be kept for a longer time without the processing and storage facilities. Such facilities are not sufficient in private and public sector. Lack of multichamber cold storage to store different vegetables and fruits in the district leads to immediate disposal of produce at low prices. There is wide gap between producers and consumers prices of vegetables and fruits and middleman enjoys more profits.

(d) Existing Institutional Mechanisms

Though there is Department of Horticulture engaged in extension of horticulture technology,yet private sector cold storages, regulated markets are available in towns for disposal of produce. There is need of strengthening the existing system to boost the horticulture in the district.

5.1.2 Interventions recommended and proposals for XI plan

- a) Make availability of good quality planting material of fruit corps.
- c) Demonstrations and trainings to bridge the adoption gaps.
- d) Micro irrigation systemrequired in horticulture crops.
- e) IPM and INM in horticulture crops.
- f) Need to encourage income generating enterprises like mushroom, bee-keeping, vermin-composting etc.
- g) Popularization of low cost poly house for vegetable nursery in the district.

5.1.3 ACTIVITY OUTPUT MATRIX FOR ALLIED SECTORS IN DISTRICT KURKSHETRA

Issues	Programmes	Activities	Collaborators/Targets	Cost
1.Farming system through dairy	<p>Establishment of commercial dairy farming of 20,50 and 100 milch animals.</p> <p>Improving the infrastructure facility for procurement of milk.</p> <p>Strengthening facilities for creation of milk processing units.</p> <p>Facilities for creation of silage and hay making</p> <p>Incentives for fodder crops in summer season.</p> <p>Creation of facilities for drinking water.</p> <p>Promotion of crossbred and buffalo in rice-wheat cropping system areas</p> <p>Promotion of murrah buffaloes.</p>	<p>AHs , lead bank and KVKs will initiate action for establishment of dairies by selecting appropriate sites depending on market strategies.</p> <p>The existing facilities of milk procurement will be extended in all villages.</p> <p>Milk processing unit may be created/strengthened at district headquarter.</p> <p>Demonstrations for economical and sustainable silage and hay making in dairies proposed in column1.</p> <p>Special demonstrations for maize/sorghum + cowpea fodder in rice-wheat system</p> <p>Village ponds need desilting</p>	DDAH andKVK	Financial /cost factor See Table 32 given in Chapter V under Animal Husbandry

Issues	Programmes	Activities	Collaborators/Targets	Cost
	A.I. and natural service through community bulls (Private Public interface)	<p>In North-East areas, creation of dairies of crossbred cows and their management.</p> <p>In North-West part, buffalo conservation be promoted.</p>		
2 Improving milk productivity	Reduction of calving period – by adopting mineral mixture feeding and balanced feeding, deworming, summer management, unestrus management, free hormone therapy for repeat breeder of resource poor.	<p>Private Public linkage and synergies be created. Retail outlets may also be associated with productivity improvement through A.I. and natural services.</p> <p>DDAHs and KVKs will jointly demonstrate the usefulness of technologies detailed in column 2. Creation of facilities for cattle feed, mineral mixture through co-operatives.</p>		

Issues	Programmes	Activities	Collaborators/Targets	Cost
3 Disease management in diary animals	Diagnostic kits for diseases, vaccination as regular feature, survey and surveillance of diseases and creation of drug banks for common ailments.	DDAHs and disease diagnostic labs to formulate common strategies for disease forecasting and management. Procurement of special kits like crytoscopes, mastitis diagnostic kit, foot and mouth diagnostic kit etc.		
4 Fisheries	Water resources for fisheries, fish seed, education	Renovation of ponds, strengthening of fish seed farm, fisheries trainings	DDF	Financial /cost factor See Table given in Chapter V under Fisheries
5 Bee-keeping	Bee-colonies, honey extracting, education	Supply of bee colonies, honey extracting and processing, monitoring and education	DHO and KVK	Bee-colonies 50x5000x5=12.5 lacs Subsidy(50%)=12.5/2=6.25lacs Honey extracting machine 10x6000x5=3.0lacs Subsidy(50%)=3.0/2=1.5lacs Honey processing unit =25 lacs Monitoring by KVK 50000x5=2.5lacs

Issues	Programmes	Activities	Collaborators/Targets	Cost
6 Vermi-Composting	Unit establishment, earth worms, education	Construction of units, supply of earth worms, trainings, monitoring	DHO,DDA and KVK	20x20000x5=20 lacs subsidy@50%=10 lacs 20x2500x5=2.5 lacs (earth worms) Monitoring by KVK 50000x5=2.5lacs
7 Mushroom	Unit establishment, compost pasteurization unit, spawn lab, training unit at KVK, education	Construction of semi-pucca house, compost pasteurization unit, spawn lab, training unit at KVK, education will be ensured by DHO and KVK	DHO and KVK	30x20000x5=30 lacs for semi-pucca house Subsidy(50%)=15 lacs 2x7lacx5=70 lacs for compost pasteurization units Spawn lab(one)=40 lacs 50 lacs for training unit at KVK 50000x5=2.5 lacs for monitoring by KVK Training Hall at KVK = 50 lacs
8 Forestry	Cultivation of other crops in forest plants Plantation of forest plants	Sugarcane, vegetables and other crops will be intercropped for value addition in forestry Free supply of plants to farmers	DFO and KVK DFO	Demonstrations 2hax50000x5=5 lac 5lac plantsx1.0lacx5 =25.0 lacs

Issues	Programmes	Activities	Collaborators/Targets	Cost
8. Vegetable production	Non-availability of high quality/hybrid seeds specially from public sector Contamination of vegetables with pesticides/heavy metal	Public/private linkage and synergies either through direct testing of existing hybrid seeds of private sector or collaborating with private sector for development of hybrid seeds at the university farm Injurious use of pesticides and the use of contaminated groundwater or sewage/canal. Random sampling of fresh vegetables for quantification of pesticide residues Survey of current status of pesticide use on vegetables for recommended or un-recommended	DHO and University Regulations regarding disposal of industrial wastes Establishment of state designated pesticide residue lab or outsourcing the residue analysis from other private/pesticides labs. DHO may collect random samples and outsource the residue analysis alternate arrangement	10 ha x5x20,000=10 lakh 100 lakh for establishment/strengthening of pesticides labs 15 lacs for maintaining lab
9. Fruit crops	Provision of nutritional gardens near/around tubewells.	DHO will ensure the distribution of five grafted plants to farmers for plantation on or around the tubewells. Only one species may be given for each location to facilitate watch and ward	DHO	10,000 locations x100x5=50 lakh

Table 26 : Proposal for Horticulture crops in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Demons. On vegetables (Hybrids)	10	2.0	10.	2.0	10	2.0	10	2.0	10	2.0	10.0
Lab for pesticide residue testing in vegetables	-	-	-	100	-	5	-	5	-	5	115
Nutritional garden	10000	10	10000	10	10000	10	10000	10	10000	10	50
Total	-	12	-	112	-	17.0	-	17.0	-	17.0	175.0

Table 27 : Proposal for vermi-composting in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
New units	20	4	20	4	20	4	20	4	20	4	-
Subsidy 50%	-	2	-	2	-	2	-	2	-	2	10
Earth worms	200	1	200	1	200	1	200	1	200	1	
Subsidy 50%	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Monitoring by KVK	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	3	-	3	-	3	-	3	-	3	15.00

Table 28 : Proposal for mushroom cultivation in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
New units	30	6	30	6	30	6	30	6	30	6	-
Subsidy 50%	-	3	-	3	-	3	-	3	-	3	15
Compost pasteurization units	2	14	2	14	2	14	2	14	2	14	-
Subsidy 50%	-	7	-	7	-	7	-	7	-	7	35
Spawn Lab	-	-	1	40	-	-	-	-	-	-	40
Monitoring by KVK	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	10.5	-	50.5	-	10.5	-	10.5	-	10.5	92.5

Table 29 : Proposal for Bee-keeping in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Bee colonies	50	2.5	50	2.5	50	2.5	50	2.5	50	2.5	-
Subsidy 50%	-	1.25	-	1.25	-	1.25	-	1.25	-	1.25	6.25
Honey extracting machine	10	0.6	10	0.6	10	0.6	10	0.6	10	0.6	-
Subsidy 50%	-	0.3	-	0.3	-	0.3	-	0.3	-	0.3	1.5
Honey processing unit	-	-	1	25	-	-	-	-	-	-	25.0
Monitoring by KVK	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	2.05	-	27.05	-	2.05	-	2.05	-	2.05	35.25

5.2 Forestry

Forests are an integral part of agriculture and play an important role in the maintenance of ecological balance. Forests meet the basic requirement of fuel and timber. Agro forestry has

been emerged as an important farming system helping the farmers in improving their livelihood. There are 45 sq. km forests in district Kurukshetra constituting 2.94% of total geographical area of the distt. And the state govt. has decided to raise it upto 10% by 2010. The main forestry species available for potential areas in the distt. are poplar, eucalyptus, Kikar, Kadam, Pongamia, Jatropha etc. Most of the social forestry is in govt. and village panchayat lands of institution.

5.2.1 Present status of support services

There is a forest research centre at village Sonthi in the district. This centre produces quality seedlings of eucalyptus, high tech clonal eucalyptus planting material and these are supplied to farmers at reasonable price to boost the forestry in the district. Apart from the research centre, there are 10 govt nurseries in the district and there are private nurseries also to supply seedlings of poplar and eucalyptus.

5.2.2 Scope of agro- forestry in the district

There is a great scope of poplar plantation due to high demand by the plywood industry existing in the adjoining district Yamunanagar. The farmers can get additional income from poplar plantation in agro forestry system as intercrops like wheat, sugarcane, potato, berseem and other vegetables can be successfully grown during 4-5 years of plantation.

Table 30 : Proposal for forestry in XI Plan

Activity	Years										Total Fin.
	2007-08		2008-09		2009-10		2010-11		2011-12		
	Phy.	Fin	Phy.	Fin	Phy.	Fin	Phy.	Fin	Phy.	Fin	
Free supply of plants (lacs)	5	5	5	5	5	5	5	5	5	5	25.0
Agroforestry (ha)	2	1.0	2	1.0	2	1.0	2	1.0	2	1.0	5.0
Total	-	6.0	-	6.0	-	6.0	-	6.0	-	6.0	30.0

5.3 Animal Husbandry

5.3.1 Introduction

Livestock is an integral part of farming systems in Haryana and it plays a great socio-economic role in the state. Good infrastructural facilities with readily available inputs and good climate, marketing facilities for milk & meat and developing entrepreneurship qualities in farmers particularly dairy farmers are basic key factors for development of animal husbandry in the state and Kurukshetra in particular. Per capita availability of milk in state is 660 g per day against recommended 250 g per day by ICMR.

5.3.2 Present Status

As per 18th livestock census 2007 the number of buffaloes, cows, sheep, goats and poultry including broilers & layers are 256739, 83530, 12754, 5386 and 1375790 in district Kurukshetra.

At present there are 45 Govt. veterinary hospital and 81 govt. veterinary dispensaries in Kurukshetra district. At present there are 33 veterinary graduates and 92 VLDA serving in district Kurukshetra.

New proposals of 15 govt. veterinary hospitals(GVH) and dispensaries are under different stages of sanction by competent authorities and a growth of 5 new GVH and 5 new GVD is proposed per year for the next 4 financial years.

Table 31 : Proposal for new Veterinary hospitals in XI plan

New Institutions	2008-09	2010-11	2011-12	2012-13
GVH	5	5	5	5
GVD	5	5	5	5

Non Recurring expenditure per GVH: Rs. 21.00 lac per GVH

Non Recurring expenditure per GVD: Rs. 15.00 lace per GVD

At present Department of Animal Husbandry and Dairying, Kurukshetra is carrying out following activities and new proposals are also being given alongside.

State Cattle & Buffalo Breeding Programme:

(a) During Year 2007-08 Cow A.I : 24400
 Buffalo A.I. : 68000

Proposal for year 2008-09	Cow A.I	:	30000
	Buffalo A.I.	:	80000

Artificial insemination by the way of frozen semen technology is done in veterinary institutions by veterinary surgeons and paravet (VLDA) which are thoroughly trained. Moreover refresher teaching at distt. Level and state level (TTI Hisar) is also being carried out.

Proposal of training is Block level training centres should be created which can become a platform for training of veterinary graduates in service, paravet staff as well as farmers so as to update their knowledge and skill.

Top quality bulls of HF Cow Bull, crossbred Bull, Murrah Bull with good pedigree record are available in three semen banks form where from semen shows are transported in liquid nitrogen jars to different veterinary institutions so as to make sure that top quality bull semen is available for each and every dairy farmer for use of its diary animal.

Doorstep A.I. services are being provided to farmers who are presently far off from their nearest veterinary institutions.

Proposal is that on a pattern of every two villages a veterinary institution should be functional. More vaccines of poultry which presently poultry farmers are purchasing of their own should be made available.

5.3.3 Strategies for improvement in Animal Husbandry in XI plan

Upliftment of BPL families : Proposals

1. Free insurance cover for diary & other livestock for all castes.
2. Free A.I. for dairy animals
3. Interest free loan with higher subsidy.
4. Calf rearing feed free of cost for both cow & buffalo calves.
5. Free hormone therapy for repeat breeder of BPL family livestock.
6. Incentive for each BPL family who produces & maintain a viable calf of by breeding & rearing.

Infertility Management:

Infertility among dairy animals is causing major loss both to farmers as well as to state economy.

Proposals

1. Mineral Mixture in adequate quantities for each animal
2. Synchronization of estrous in such animals and then their A.I. after 72 hours.
3. Embryo transfer technology for animals.
4. Treatment of intrauterine infections by way of ecbolics and antibiotics.
5. Practically implement successfully & conveniently each and every policy of state govt.

Health care Aspects

Free health check, treatment policy is functional and deworming, anti-diarrhoeal, stomachache, antiseptic dressing, vaccination is being given to each and every farmer free of cost.

Proposal for supply of following medicines in adequate quantities could prove more useful and will be a boom for dairy farmers.

- (a) Antibiotics as Amoxy doacillim, Ampiloxaciin, emoflorain, Gentamycin, Amikacin and third generation cephalosporins are need of hour.
- (b) Antibiotic, analgesics and anti-inflamnortory drugs viz Keloprofen, meloxicam, analgin, nimuslide
- (c) Antallergic drugs
- (d) Anti-ticks both in solution form to be used as spray and injectbles.
- (e) Anti diairhoeal
- (f) Boluses correcting ruminal atony & summihol pH.
- (g) Phenyl, T.T. oil, antibacterial & antifungal applications
- (h) Antiprotozoan drugs.
- (i) Bandages, cotton, disposable A.I. gloves.
- (j) Post mortem set, surgical instruments
- (k) Mineral mixture @ 12 kg per animal (adult) per year.

Vaccinations

At present free H.S. vaccination and FMDV vaccination are done in cattle & buffaloes and sheep pox, ETV, PPR, R₂B, FRDR for various species is done. Proposal is to get post bite rabies vaccination for each animal affect, in govt. veterinary institution.

Commercial High Tech Dairy of 20 milch animals

Ten lacs for advanced high tech dairy commercial with 1.5 lac subsidy. Generation of employment.

1. By way of establishment of mini dairy units, of 2 MA(Milch Animals),, 3MA, 5MA, 10 MA , 20 MA.
2. Training of farmers in poultry field for establishment of poultry units.
3. Training of farmers for sheep, & piggery units.
4. Training of farmers for processing and marketing techniques of milk & meat products.

5.3.4 Other Schemes in Operation

1. Supply of pedigree bulls to Gram Panchayats at subsidized rates
2. Murrah incentive money programme
3. Calf rearing scheme
4. Sheep unit scheme
5. Piggery unit scheme
6. Mini dairy scheme for widows, S/C case at higher subsidies.
7. S/C insurance: free livestock insurance of S/C farmer dairy animals.
8. Organization of calf rallies
9. Organization of livestock shows
10. Organization of health care camps
11. Women awareness camp: 1 camp per village per year should be held.

Table 32 : Proposal for animal husbandary in XI Plan.

Sr.No.	Particular	2008-09	2009-10	2010-11	2001-12	Total
1.	Opening of new GVH institution GVD	5 5	5 5	5 5	5 5	20 20
2.	Proposed expenditure on opening of new GVH=1 institution GVD-2	21,00 lacs x 5 =105 lacs 75 lacs	110 lacs 80 lacs	120 lacs 85 lacs	130 lacs 90 lacs	465 lacs 175 lacs
3.	Artificial insemination proposed No. of AI Cow No. of AI Buff	30000 80000	33000 85000	36000 90000	39000 95000	138000 350000
4.	Proposed expenditure on AI COW Buffalo	30000x100 30 lacs 80 lacs	32 lacs 85 lacs	35 lacs 90 lacs	40 lacs 95 lacs	137 Lacs 350 lacs
5.	Health care aspect proposed expenditure	300 lacs	325 lacs	350 lacs	375 lacs	1350 lacs
6.	Vaccination expenditure (proposed)	150 lacs	165 lacs	175 lacs	190 lacs	680 lacs
7.	Upliftment of B.P.L families	10 lacs	15 lacs	20 lacs	25 lacs	70 lacs
8.	Infertility management	150 lacs	165 lacs	175 lacs	190 lacs	680 lacs
9.	Commercial Dairy of 200 milch animals	15 165 lacs	20 220 lacs	25 275 lacs	30 330 lacs	90 990 lacs
10.	Generation of employment	25 lacs	30 lacs	35 lacs	40 lacs	120 lacs
11.	Others	50 lacs	60 lacs	70 lacs	80 lacs	260 lacs.
Total		1140.00	1287.00	1430.00	1585.00	5442.00

5.4 Fisheries

5.4.1 Introduction and present status

The fish cultivation in the district Kurukshetra is done mainly in village community panchayat ponds spread in an area of 334 ha. The fish production during the year 2006-07 was 1522 tonnes. There is a national fish seed farm in the district spread over an area of 14.6 ha.

5.4.2 Development of Fisheries Water Resources

The fisheries is mainly in the village ponds/community ponds in the district. About 460 hectares water spread area of the community ponds are available in the district, out of which 325 hectares are covered under fish farming. The remaining water area can be covered under fisheries after technically renovation of the village ponds.

It is a fact that there are multidisciplinary uses of the community ponds in the villages apart from the fish farming. But unfortunately, these ponds are shrinking year by year because of silting, pollution, water-weeds and mainly illegal encroachment etc. So, technically

renovation of village ponds is a need based activity which not only promote the fisheries but also generates the employment, income resources for panchayats, develop a common water resources/infrastructure for domestic uses/welfare for the people, harvest the excess rain water and recharge the water table etc. 25 hectare water area can be renovated every year @ 2.0 lakh per hectare.

5.4.3 Strengthening of National Fish Farm and Seed Programme

There is a largest National Fish Seed farm at Jyotisar in District Kurukshetra having a total 14.6 hectare area and 6 hectare waterspread area. This fish seed farm has a capacity to produce 1.00 crore Fries per annum. To meet out the increasing demand of quality fish seed (Fry, fingerlings, advance fingerlings), it is necessary to strengthen this fish seed farm. For this, the hatchery capacity can be improved with the latest technology. Apart from the improvement of Hatchery, other main infrastructure of the farm e.i. nursery ponds seed rearing ponds can be improved to increase their productivity. The maintenance of the seed farm and other important inputs infrastructure i.e., machinery, equipments, & tools, of latest technology is very important part of any seed farm to maintain and increase the production capacity of the seed farm. So these infrastructure at fish seed farm is need based for production of fisheries and welfare of fish farmers community.

5.4.4 Establishment of fish seed farm/units by Fish Farmers

Some fish farmers may be motivated to establish their own fish seed Hatchery/fish seed rearing farms to meet out the increasing demand of Fish Seed especially fingerlings/advance fingerlings. So a project can be prepared to make establishment of two fish seed rearing hatcheries every year by the farmers in the district. For this, financial and technical assistance will be provided to the fish seed producers @ 50% portion of the total cost of the project. Training, demonstration/exposure visit etc. will be arranged for fish seed growers as technical assistance.

5.4.5 Financial Assistance to the Fish Farmers

Any person who adopt the fish farming for the first time should be assisted financially as well as technically. So the fish farmers should be assisted financially for arranging the fishery inputs (feed & fertilizer), machinery & equipments i.e. aeztors fishing nets, medicines, water pH testing meter etc. All these items should be supplied to the farmers during fish farming of first year once a time.50% portion of total expenditure on all these

items can be provided as subsidy to the farmers. Fish seed should be supplied free of cost during first year.

5.4.6 Capacity building

It has a very important role in technical profession like fisheries on the other hand, fisheries is somehow a new subject though Kurukshetra is a vegetarian area of the country. Therefore, it need more work in the field of fisheries extension. So, trainings at various level, demonstrations, exposure visits, Kisan gosthies etc. will be arranged to popularize the fish farming among the people and to transfer the technology to the fish farmers for increasing productivity .

Table 33 : Proposal for fisheries in XI Plan

(Rs.in lakh)

A) Budget required in the existing schemes								
Sl. No	Name of the Schemes	Year					Total	Remarks
		2007-08	2008-09	2009-10	2010-11	2011-12		
1.	Development of fisheries water resources	50.00	50.00	50.00	60.00	60.00	270.00	25 Hect. Water area will be renovated per year @ Rs.2.00 lakh/hect cost may increase after two year
2.	Strengthening of National fish seed Dev. Program	15.00	15.00	15.00	20.00	20.00	85.00	To increase hatchery capacity, maintenance of well equipped fish seed farm
3.	Establishment of fish and farm/units by fish farmers	10.00	10.00	10.00	15.00	15.00	60.00	Two units every year will be established & fully equipped 5 lakh each (@ 50% portion)
4.	Financial assistance to the fish farmers	25.00	25.00	25.00	30.00	30.00	135.00	25 hect. Water area will be assisted every year @ Rs. 1.00 lakh/hect
5.	Fisheries education, training and extension	10.00	10.00	10.00	15.00	15.00	60.00	
	G.Total	110.00	110.00	110.00	140.00	140.00	610.00	

CHAPTER-VI

District Plan

6.1 Introduction

The proposed district plan includes agriculture, horticulture, forestry, animal husbandry and fisheries as the major activities undertaken in the district Kurukshetra. The existing status of these sectors have been issued in detail in the preceding chapters with the proposed outlays for XI plan.

6.2 Growth drivers

The targets will be achieved using different growth drivers in agriculture and allied sectors as follows:

6.2.1 Agriculture

- a) Increasing area under hybrids in rice, improved varieties in wheat and sugarcane and high yielding hybrids in sunflower.
- b) Resource conservation technologies for sustaining and improving the productivity levels.
- c) Mechanization for increasing water use efficiency.
- d) Increasing seed replacement rate.
- e) IPM, INM and IWM.
- f) Demonstration and trainings including farmers
- g) Human resource development.

6.2.2. Horticulture

- a) Increasing area under fruits and vegetable crops.
- b) Increasing seed replacement rate of potato & onion.

- c) Encouraging micro-irrigation in fruit crops.
- d) Providing improved planting material of fruit crops.
- e) IPM and INM
- f) Encouraging income and employment generating vocations like mushroom, bee-keeping, vermocomposting and low cost poly house for nursery raising.
- g) Demonstrations and trainings including farmers field schools for effective dissemination of technology.

6.2.3 Forestry

- a) Increasing area under forests through plantation in community lands.
- b) Free supply of forest plants for creating interest in forestry.
- c) Increasing area under agro-forestry.

6.2.4. Animal Husbandry

- a) Establishing new Govt. Veterinary Hospitals and dispensaries for easy access to livestock farmers.
- b) Encouraging artificial insemination (A.I.) for breed improvement and ultimately milk yield per animal per unit time.
- c) Health care services by providing medicines and free health check camps in villages.
- d) Enhancing vaccination programmes to escape the animals from seasonal diseases.
- e) Infertility management by supply mineral mixture in adequate quantity for livestock.
- f) Establishing commercial dairy farming for income and employment generation.
- g) Supply seed of forage crops to provide fodder round the year.

6.2.5 Fisheries

- a) Development of water resources for fisheries.

- b) Making availability of good quality fish seed by strengthening the existing fish seed farm in district.
- c) Encouraging fish farmers for fish seed production to meet the requirement.
- d) Promoting assistance to farmers in the beginning of fisheries as an enterprise.
- e) Education and training to farmers and human resource development of technical staff of fisheries department.

6.3 Innovative Schemes:

6.3.1 Agriculture

- a) Linkages and synergies with private as well as public sector for hybrids development and proliferation in rice and sunflower.
- b) Resource conservation technologies including green manuring with dhaincha, sowing of wheat with zero till seed cum fertilizer drill, laser leveling, bed planting.
- c) Multiple land use techniques by infusing summer moong in rice-wheat cropping system
- d) IPM, INM and IWM.
- e) Demonstrations, trainings and farmer field schools.

Innovative scheme on paddy transplanter

The farmers are facing the labour problem required for transplanting of paddy (rice). The migratory labour from other state has become scarce and costly. The new technology in the form of paddy transplanter needs to be tested at large scale for transplanting of rice.

Table 34 : Proposal for Paddy transplanter in XI plan

Activity	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Paddy transplanter	5	10	5	10	5	10	5	10	5	10	50
Demons. On transplanting	40	2	40	2	40	2	40	2	40	2	10
Capacity building	-	0.5	-	0.5	-	0.5	-	0.5	-	0.5	2.5
Total	-	12.5	-	12.5	-	12.5	-	12.5	-	12.5	62.5

Strengthening of training infrastructure facilities at Krishi Vigyan Kendra (district level) and Farm Information and Advisory Centers (FIACs -at Block Level) .

Trainings are one of the most important extension activities conducted by extension and development institutions/ departments to educate farmers on different aspects of agricultural and allied activities. The changing agri -economic scenario , fast technology generation and its applications in complex world of today’s agriculture necessitated constant trainings for capacity building and skill upgradation of farmers as well as technical staff. The KVK and FIACs are established training institutions at district and block level, respectively, to cater the training needs of different clientele. Infrastructural facilities are needed to be created at both levels for conducting training effectively to raise farm productivity.

Logical framework matrix

Narrative Summary	Objectively verifiable indicators
<p>Project goal- Development of human resource for raising farm productivity Purpose- To strengthen facilities at district and block level for conducting effective training programmes for farmers and field staff. Output- Well informed, skilled and upgraded farmers and field staff for rationale decision making in agriculture and allied fields.</p>	<p>Upgradation in knowledge and skills of the farmer and staff. Increase in production , productivity and profitability of crops and allied enterprises.</p>

A) Cost For Strengthening Infrastructure at KVK (at district level)

Sr. No.	Infrastructure	No.	Cost (in lacs)
1	Well Equipped Training Hall	1	50.0
2	Information Technology Lab	1	25.0
3	Automatic Weather Station	1	8.0
	Total		83.0

B) Cost For Strengthening Infrastructure at FIAC (block level)*

Sr. No.	Infrastructure	No.	Cost (in lacs)/ unit	Total cost (Rs. lacs)
1	Well Equipped Training Hall	5	30.0	150.0
2	E- connected computer lab	5	10.0	50.0
	Total			200.0

Total Cost of the Project (A+B)= Rs. 83.0+200.0 = Rs.283.0 lacs

*** There are five blocks in the district and each block has one FIAC.**

6.3.2. Horticulture

- a) Seed replacement rate of potato
- b) Micro-irrigation in fruit crops
- c) Mushroom, bee keeping, vermin composting and low cost poly house.
- d) IPM and INM
- e) Demonstration, trainings and farmer field schools.

6.3.3. Forestry

- a) Plantation of forest plant
- b) Strengthening of forest nursery
- c) Agro-forestry for multiple land use
- d) Demonstrations and trainings.

6.3.4. Animal Husbandry

- a) Establishing new hospitals
- b) Artificial insemination
- c) Mineral mixture for improving fertility of animals.
- d) Commercial dairying
- e) Vaccination
- f) Increasing area under fodder crops.
- g) Human resource development of staff.

6.3.5. Fisheries

- a) Renovation of community ponds
- b) Fish seed production
- c) Training and extension activities for farmers.

d) Human resource development of staff.

6.4 Vision of XI Plan

- Improving living standard of farming community through enhanced productivity of various crops.
- To give stimulus to productivity through adoption of resource conservation technologies in a more sustainable manner.
- Improving productivity of different fruit and vegetable crops through linkages and synergies with public and private sector.
- Increasing milk availability per capita per unit time through improving animal breeding, animal health, providing green fodder and mineral mixture throughout the year.
- Increasing fish production using community ponds to improve farmers income.
- Providing opportunities to rural youth through income generating activities like mushroom ,bee-keeping and vermiculture.
- Providing environmental safety through afforestation and increasing income by introducing agro-forestry for multiple land use.

6.5 Financial Proposals for XI plan in Agriculture and Allied Sectors.

6.5.1 Table 35 : Proposal for different crops in agriculture in XI Plan

Crops	2007-08	2008-09	2009-10	2010-11	2011-12	Total Rs.(lacs)
Wheat	153.0	153.0	153.0	153.0	153.0	765.0
Rice	12.5	12.5	12.5	12.5	12.5	62.5
Sugarcane	1.0	1.0	1.0	1.0	1.0	5.0
Sunflower	0.25	0.25	0.25	0.25	0.25	1.25
Total	165.25	165.25	165.25	165.25	165.25	826.25

6.5.2 Table 36 : Proposal for different resource conservation technologies (RCTs) in agriculture in XI Plan

Activity	2007-08	2008-09	2009-10	2010-11	2011-12	Total Rs.(lacs)
Zero tillage	33.75	33.75	33.75	33.75	33.75	168.75
Bed planting	12.5	12.5	12.5	12.5	12.5	62.5
Laser leveling	90.5	90.5	100.5	100.5	100.5	482.5
Paddy transplanting	10.0	10.0	10.0	10.0	10.0	50.0
Green manuring	37.5	37.5	37.5	37.5	37.5	187.5
Summer moong	37.5	37.5	37.5	37.5	37.5	187.5
Water management	837.5	837.5	837.5	837.5	837.5	4187.5
Total	1059.25	1059.25	1069.25	1069.25	1069.25	5326.25

6.5.3 Table 37 : Proposal for different other activities in agriculture in XI Plan

Crops	2007-08	2008-09	2009-10	2010-11	2011-12	Total Rs.(lacs)
IPM&IWM	38.5	71.0	13.5	8.5	8.5	140.0
SSNM	13.0	213.0	23.0	23.0	23.0	295.0
Capacity building	5.5	5.5	5.5	5.5	5.5	27.5
Exposure visits	1.0	1.0	1.0	1.0	1.0	5.0
Total	58.0	290.5	43.0	38.0	38.0	467.5

6.5.4 Table 38 : Proposal for mechanization in agriculture In XI Plan

Machines	2007-08		2008-09		2009-10		2010-11		2011-12		Total
	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Phy.	Fin.	Fin.
Reapers	50	50	50	50	50	55	50	55	50	55	-
Subsidy (50%)	-	25	-	25	-	27.5	-	27.5	-	27.5	132.5
Reaper Binder	5	17.5	5	17.5	5	17.5	5	20	5	20	-
Subsidy (50%)	-	8.75	-	8.75	-	8.75	-	10	-	10	46.25
Potato Planter	50	10	50	10	50	12	50	12	50	12	-
Subsidy (50%)	-	5	-	5	-	6	-	6	-	6	28.0
Potato Digger	50	12.5	50	12.5	50	12.5	50	15	50	15	-
Subsidy (50%)	-	6.25	-	6.25	-	6.25	-	7.5	-	7.5	33.75
Total		45.0	-	45.0	-	48.5		51.0		51.0	240.5

6.5.5 Proposal for horticultural crops in XI Plan

Table 39 : Proposal for horticultural crops in XI Plan

Crops	2007-08	2008-09	2009-10	2010-11	2011-12	Total Rs.(lacs)
Fruit crops	10.0	10.0	10.0	10.0	10.0	50.0
Vegetable crops	2.0	2.0	2.0	2.0	2.0	10.0
Pesticides residue testing lab	-	100.0	5.0	5.0	5.0	115.0
Mushroom	10.5	50.5	10.5	10.5	10.5	92.5
Beekeeping	2.05	27.05	2.05	2.05	2.05	35.25
Vermicomposting	3.0	3.0	3.0	3.0	3.0	15.0
Capacity building	0.5	0.5	0.5	0.5	0.5	2.5
Total	28.05	193.05	33.05	33.05	33.05	320.25

6.5.6 Proposal for forestry in XI Plan

Table 40 : Proposal for forestry in XI Plan

Crops	2007-08	2008-09	2009-10	2010-11	2011-12	Total Rs.(lacs)
Agroforestry	1.0	1.0	1.0	1.0	1.0	5.0
Free supply of plants	5.0	5.0	5.0	5.0	5.0	25.0
Total	6.0	6.0	6.0	6.0	6.0	30.0

6.5.7 Proposals of Animal Husbandry for XI Plan

Table 41 : Proposal for animal husbandry in XI Plan

Sr. No.	Particular	2008-09	2009-10	2010-11	2001-12	Total
1.	Opening of new GVH institution GVD	5 5	5 5	5 5	5 5	20 20
2.	Proposed expenditure on opening of new GVH=1 institution GVD-2	21,00 lacs x 5 =105 lacs 75 lacs	110 lacs 80 lacs	120 lacs 85 lacs	130 lacs 90 lacs	465 lacs 175 lacs
3.	Artificial insemination proposed No. of AI Cow No. of AI Buff	30000 80000	33000 85000	36000 90000	39000 95000	138000 350000
4.	Proposed expenditure on AI COW Buffalo	30000x100 30 lacs 80 lacs	32 lacs 85 lacs	35 lacs 90 lacs	40 lacs 95 lacs	137 Lacs 350 lacs
5.	Health care aspect proposed expenditure	300 lacs	325 lacs	350 lacs	375 lacs	1350 lacs
6.	Vaccination expenditure (proposed)	150 lacs	165 lacs	175 lacs	190 lacs	680 lacs
7.	Upliftment of B.P.L families	10 lacs	15 lacs	20 lacs	25 lacs	70 lacs
8.	Infertility management	150 lacs	165 lacs	175 lacs	190 lacs	680 lacs
9.	Commercial Dairy of 200 milch animals	15 165 lacs	20 220 lacs	25 275 lacs	30 330 lacs	90 990 lacs
10.	Generation of employment	25 lacs	30 lacs	35 lacs	40 lacs	120 lacs
11.	Others	50 lacs	60 lacs	70 lacs	80 lacs	260 lacs.
	Total	1140.00	1287.00	1430.00	1585.00	5442.00

6.5.8 Table 42 : Proposal for fisheries in XI Plan

(Rs.in lakh)

Sl. No	Name of the Schemes	Year					Total	Remarks
		2007-08	2008-09	2009-10	2010-11	2011-12		
1.	Development of fisheries water resources	50.00	50.00	50.00	60.00	60.00	270.00	25 Hect. Water area will be renovated per year @ Rs.2.00 lakh/hect cost may increase after two year
2.	Strengthening of National fish seed Dev. Program	15.00	15.00	15.00	20.00	20.00	85.00	To increase hatchery capacity, maintenance of well equipped fish seed farm
3.	Establishment of fish and farm/units by fish farmers	10.00	10.00	10.00	15.00	15.00	60.00	Two units every year will be established & fully equipped 5 lakh each (@ 50% portion)
4.	Financial assistance to the fish farmers	25.00	25.00	25.00	30.00	30.00	135.00	25 hect. Water area will be assisted every year @ Rs. 1.00 lakh/hect
5.	Fisheries education, training and extension	10.00	10.00	10.00	15.00	15.00	60.00	
	G.Total	110.00	110.00	110.00	140.00	140.00	610.00	

6.5.9 Table 43 : SUMMARY OF PROPOSALS FOR AGRICULTURE AND ALLIED SECTORS IN DISTRICT KURUKSHETRA IN IX PLAN

Sector	Years					Total Fin.(Lakhs)
	2007-08	2008-09	2009-10	2010-11	2011-12	
Agriculture	1327.5	1843.0	1326.0	1323.5	1323.5	7143.5
Horticulture	28.05	193.05	33.05	33.05	33.05	320.25
Forestry	6.0	6.0	6.0	6.0	6.0	30.0
Animal Husbandry	-	1140.0	1287.0	1430.0	1585.0	5442.0
Fisheries	110.0	110.0	110.0	140.0	140.0	610.0
Total	1471.25	3292.05	2762.05	2932.55	2932.55	13545.75

CONCLUDING REMARKS

In order to improve the livelihood of rural households, there is need to enhance the farm income in a holistic manner. Enhanced productivity can be achieved by adoption of improved environment friendly technologies in a sustainable manner linked with good market potential. The present comprehensive district agriculture plan has been prepared keeping in view the current and future aspects concerning livelihood security of farming community of the district with the following remarks.

1. Rice and wheat are major crops of the district which occupies 74 per cent of total cultivated area. The evolution of green revolution varieties and their management, creation of favorable infrastructure of irrigation, fertilizer industry and assured marketing coupled with minimum support price policy augmented the area as well as productivity of rice and wheat. During the last few years the growth in cereal production (rice and wheat) has been due to agronomic management and free market economy by giving good prices of agricultural produce to its farmers. The continuous dominance of rice-wheat cropping system has depleted underground water resources and resulted in nutrient mining. The recent debate on falling water table and deteriorating soil health has prompted the scientists to rethink. The extension functionaries and scientists are now advising the farmers to adopt conservation agriculture, judicious use of irrigation water, balance use of fertilizers and need based pesticides. India and perhaps the whole world are short of rice and wheat which are best grown in district Kurukshetra. We, therefore, can not reduce the area of rice and wheat under diversification that does not guarantee supplies to growing population of our country. The scientists and even farmers have favored diversification within rice-wheat cropping system with technologies that are less costly and allow savings in the natural resources. Thus the

slogan of diversification may have flown without any tangible outcome. The efforts need to be concentrated on producing more cereals per unit area because the scope of area expansion under crops is squeezing due to urbanization. There is need of strong linkages and synergies with the public and private sectors for hybrids/varieties to improve productivity using less resources.

2. The current need is to focus our activities throughout the value chain on the challenges of sustainable agriculture development starting from production to processing and from crop based enterprise to all other enterprises that help farmers to increase their income and remain engaged at the same time. The goal of the plan is to increase productivity at 4% per year, reduce water consumption by 10% in rice- wheat cropping system and reduce energy consumption by 10% in agriculture. Further , the reduction in energy consumption upto 50% need to be targeted through reduced fuel consumption at crop establishment at least. Savings in energy consumption is expected to reduce the associated carbon dioxide emissions. The price of already subsidized diesel will may rise further in future. Resource conservation technologies like zero-tillage for conservation agriculture are available that can reduce the energy consumption and increase profits. Laser land leveling and bed planting can save the scarce underground water resource. Green manuring and inclusion of summer moong in rice-wheat crop rotation in fallow period will impove the soil health and decrease the input pressure of all kinds. In future , the decreasing size of operational holding in district Kurukshetra will demand the use of these technologies to increase resource use efficiency.

3. The farmers of district Kurukshetra have become important competitors in all sorts of agriculture produce, from cereala to milk, mushroom, honey, vagatables and fisheries. The district is well known for basmati rice. The success of the district economic transformation

can be measured by the falling share of agriculture in the gross domestic product which has decreased to almost 22%. Agriculture is likely to provide less jobs now compared with over two-thirds only ten years ago. Even so , over 65% of population still lives in villages, so a successful rural economy will remain the key to maintaining its impressive progress. Knowledge and skill of our farmers and extension agencies help us to understand our farming systems better. It is also a source of creative , innovative and economic strength especially in situations that currently exists in the district where its young population does not wish to adopt farming as a profession. The urbanization is happening in the district also calls creation of culture that helps farmers to adopt subsidiary occupations. The proportion of farmers directly working on farms is likely to decrease steadily. Diversity within the rice-wheat cropping system and across sectors in the form of integrated farming systems is one of the important ingredient of success. It is sure that the different sources of income including crops , dairying, mushroom cultivation, fisheries and honeybee production etc can help farmers to get dialy income. Integration and balancing crop cultures and subsidiary occupations is the focus of this plan to boost the income and living standard of the farming community.

4. The demand for labour in district Kurukshetra is increasing for rice transplanting, harvesting and other agriculture operations including grading and processing of grains, vegetables and fruits. On the contrary the availability of local labour is decreasing. This will demand more mechanization for sowing, harvesting, storage and processing. The increased targets of XI five year plan could be met only by the adoption of efficient higher technology levels in all cropping system especially in rice-wheat cropping system. This would require large scale availability of machinery for land leveling (laser land leveler), tillage (especially zero tillage machines, bed planter, paddy transplanters) in the district. It is expected that the

custom hire services will be encouraged. It is also expected that more land will be available on lease and therefore farmers would need more machinery for saving labour and increasing the efficiency of inputs. Yield level of top 10 percent farmers may be assumed as an attainable yield in any coming season. The exercise of monitoring yield levels in the district must be done for planning for the next season. This exercise may be made mandatory and should form part of planning process for any current year. Time has now come to again review commendation of fertilizers and to meet the target of attainable yield of 10 per cent farmers, the recommendations of fertilizers may have to increase from the current level to harvest maximum productivity levels.

5. As the information technology has become accessible, easy and affordable, extension services and/or can be out sourced from any where. It can be seen in spread of hybrids of rice and vegetables. More and more linkages synergies need to be developed by outsourcing technologies. More and more infrastructure facilities need to be put to use with DDA's, DHO, Animal Husbandry officer, Fisheries Officers which then can be linked to KVK Kurukshetra for a perfect integration of agriculture. Data center need to be created to increase the computing capacity of extension workers. The data center for state may be located at main campus of CCS HAU Hisar.