Study to Evaluate Success of Diversification of Agricultural Crops in Haryana

Report

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I dedicate the report to the untiring farmers.

(Dr. Vikash Kumar)

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Executive Summary

It is well understood that the Green Revolution which was launched in states of Haryana, Punjab and Uttar Pradesh (especially western part) in 1960s, helped India overcome the acute food deficit and achieve self-sufficiency in food grains especially in rice/paddy and wheat.

Availability of high yielding seeds, chemical fertilizers, well connected irrigation facilities, improved road networks, opening of new markets and relatively secured per acre yield and minimum support price (MSP) led to paddy and wheat crop specialization resulting into negative impacts environmental and human health. Also, rice and wheat monopoly has reduced the leguminous pulses and other traditional crops such as maize, jowar and bajra that not only disturbed the dietary habits in rural areas, but also raised economic constraints on poor and marginalised people by abstaining them from obtaining affordable sources of nutrition.

Keeping in view of the ever increasing crop specialisation in the state, the Central Government and the three State Government of Haryana have been endeavouring in the recent years to provide food security through ecologically sustainable and economically viable diversification of agriculture and promotion of scientific planning and cropping pattern to improve the yield per hectare by better and integrated crop management. However, the efforts towards diversification or agricultural crops have yielded little or no results so far. Consistent MSP and secured market for paddy and wheat on the one hand and inadequate procurement of alternative crops on the other have been attributed as major reasons for the dismal achievement of crop diversification in these states.

Against this backdrop, the present study was conducted to assess the prospects and challenges as also to study to evaluate the programme for diversification of agricultural crops in the state as well as negative externalities associated with mono-cropping and tries to unravel socio-cultural and economic reasons which have considerable influence in selection of crops by the farmers.

The study highlights various aspects of geographical variations, socio-cultural issues, prospects and challenges in crop diversification in the state with plausible trends other than mere raising debate over MSP for rice and paddy and inadequate procurement of alternative crops. The report is prepared in a precise manner so as to help policy makers to identify

specific issues and challenges and take concrete steps towards the success of crop diversification in Haryana.

The official Action Plan document does not record positive performance of maize demonstration in 2016-17, largely due to introduction of online registration system. Across the districts, farmers and agricultural extensions officers informed that since most of the farmers are not computer literate and their hesitation to provide basic information about the land holdings resulted in the minimal achievement of targets.

A majority of the farming population in Haryana comprises of marginal and small famers. Majority of the marginal and small cannot afford to shift from an economically safe crop like paddy to experiment with maize. Therefore, most of them did not avail to the first component under CDP. Only progressive farmers with a decent land holding applied and gained from the scheme. The second component assured heavy implements and tractor based farming equipments also failed to attract the marginal and small farmers because of high input cost and maintenance.

Subsidy for Under Ground Pipe Line under Site Specific component failed drastically. The farmers were suspicious of the quality of pipes availed under the scheme which was claimed to be available at an inflated price. Most of the farmers abstained from availing the scheme and insisted on using the products available cheaply in the market.

Responses to the distribution of dhaincha seeds were average in the state. However, the farmers have welcomed the move and demanded inclusion of other organic inputs such as vermin compost into the programme.

The fourth component on contingency and awareness and training is the most efficient of all the components. Due to the high number of krishi mela and gosthi at block, district and state level; farmers were found aware of new equipments/implements, new variety of seeds and pesticides varieties.

It can be observed that diversification programmes received a cold shoulder by the farming community, especially the small land holders who cannot afford experimentation in agriculture. On the condition of unanimity, many of the ground level agricultural officers asserted that the targets set under CDP were ambitious with inadequate infrastructure of their implementation, such as, shortage of staff, no or limited office infrastructure for Agriculture Development Officers, delayed reimbursement of subsidy etc.

The mismatch in figures point at a larger gap between planning, ground implementation and assessment pedagogy. It is important to consider and understand the commercial viability of agricultural practice. During group discussions, majority of the

farmers admitted that they are forced to grow safer crops like paddy and wheat despite knowing the consequences of inappropriate exploitation of natural resources and extended health hazards due to excessive use of pesticides. It is needed that agriculture is seen as an enterprise which needs returns on the capital. Since most of the farmers reported loss in their farm output they had to borrow loans to repay their input dues. Small and medium farmers often use agriculture loans to meet non agricultural expenses, such as wedding, construction of house and payment of education fees etc.

Inadequate procurement and delay in payments and a big share of the profit being taken away by middlemen and traders have resulted in the present state of financial insecurity among the farming community. A farmer as an institution needs to look after himself and his dependent workforce and family members to sustain a decent life. Somehow, it seems the complex web of financial insecurity in agriculture is what has kept the farmers entangled in the vicious circle of sowing, caretaking, reaping, storage, transporting and selling.

It has been found during the study that despite various state led interventions, poor procurement and low MSP of non-paddy-wheat crops remains the major factor restricting the farmers from large scale production of maize, oilseeds, cotton and pulses etc. However, these crops are general ingredients of the regular dietary pattern in India, especially the Northern region. There is a greater need of developing area and crop specific processing units so as to enable farmers to sell their produce locally at adequate price.

State run procurement is usually delayed for all crops, leaving the farmers at the mercy of the local vendors who procure at prices below MSP, and farmers are forced to sell since it is logical to sell than bear the logistics costs. Moreover, quite often farmers fail to sell their produce due to the poor quality cited by the procurement agencies. The procurement is poor for all crops, including paddy and wheat, but due to high demand of paddy and wheat, farmers are able to obtain decent price from. On the other hand they fail to find suitable market for maize, onions and tomatoes during low demands.

In across the districts under study it was found that contract farming and farmer producer organizations were non-existent. Many of the farmers were unheard of these cooperation agencies. The government of Haryana needs to promote establishment and efficient functioning of these coordinating agencies which can safeguard farmers based on the principles of cooperative development. It is also found, the number of small land holders have increased. To promote agro forestry along with intercropping, farmers' interests need to be safeguarded. In this direction, contract farming and cooperative organisations could play a vital role.

In terms of administrative and institutional reforms, some of the concerned officials suggested a 'single window' system for effective delivery and implementation of agricultural schemes. In most of the instances different departments were found engaged in similar or complementary schemes in terms of their respective aims and objectives

There is also a need to revise the list of priority implements. Happy seeder and zero till seed drill perform almost same functions, either of the one should be subsidized to allow subsidy on other components. As also already popularised farm implements should be phased out from the action plans.

It is suggested that rather than setting up district level targets, allotment of block level targets would prove more feasible and better serve the objectives of diversification programmes.

Most of the agricultural officers working at the village levels lacked basic amenities such as support staff and transport to carry out extension tasks in the remote villages. The lack of basic amenities at ground level restricts the officers from bringing out desirable and efficient results. Adequate provisions should be provided to the extension workers at the village level; be it in form of infrastructure, vehicles and support staff to carry out their official duty efficiently and proactively.

Except for loans taken under KCC, the percentage of farmers availing loans from institutional sources is minimal due to cumbersome procedure involved in the process. Farmers find the documentation procedure cumbersome and instead prefer approaching the local money-lenders. The landless farmers operating on leased lands do not qualify to avail benefits under agricultural schemes like CDP. The landless tenant farmers asserted that they should also be given benefits for loans, subsidy and irrigation facilities.

It is advocated that the Minimum Support Prices should be extended to all the crops which are intended to be promoted against paddy. Adequate MSP and efficient and timely procurement on such crops shall encourage farmers to opt the idea of crop diversification.

The farmers involved in agro forestry suggested that the duration of subsidy for poplar should be increased from 3 to 5 years as popler plantation need constant care such as trimming, manure and protection from pests which are cost intensive. Since that selling price of popler has decreased significantly farmers found it unsustainable to further increase the acreage of popler. Water logging on the fields and saline water is another major concern in agriculture. As a result ground water has turned unsuitable for irrigation in some areas. For instance in Sonipat district, farmers stressed to be linked through surface irrigation networks (canal) to tackle the issue of saline water.

It was also observed that PB-1509 (Pusa Basmati) if promoted can contribute significantly in controlling the current resource crises related to paddy cultivation. However, PB-1509 fetches low MSP in the market when compared to PB-1401(the 'Muchhal basmati'), Pusa 1121 and other presently listed 'A grade' paddy varieties. Since varieties like PB-1509 takes less time in harvest, it allows the farmer with a sufficient time window (20-25 days more) before sowing the next crop. During this extra time paddy straws can be allowed to decompose on its own, largely limiting the problem of stubble burning. The crop is sown late and reaped earlier, has multiple advantages yet awaits a crucial intervention from the state.

Policies and implementation of diversification of agricultural crops are in shackles due to problems of usury. It becomes the sole responsibility of the state to extend financial 'assurance' to the farming community. The farming community needs assurance of sustainable livelihood, before taking on any agricultural experiment.

The current strategy aims to increase 'overall production' by promoting 'total area cropped' via subsidized capital investment in input costs. Therefore, to ensure that farmers put in heart and soul in crop diversification, a policy of proportionately higher MSP over the concerned crops supported by efficient procurement and market price support in form of MSP can help the state towards an inclusive and holistic Action Plan.

Additionally, the level of awareness being provided in the fairs is limited to introducing new seeds, fertilizers and equipments available in the markets. But there are hardly any efforts on revolutionizing the farmer into modern farming and marketing practices. Prioritisation of post-production marketing through cooperative organizations shall promote diversification among majority of small and marginal farmers.

Chapter I

Introduction

The state of Haryana, since the early years of its creation, has emerged as one of the forerunners of agricultural prosperity in the country. Along with Punjab and Uttar Pradesh, Haryana championed the Green Revolution and focused on high yield cropping system thus helping India to overcome the acute food deficit from 1960s onwards. Introduction of high end technology, improved socio-economic infrastructure, adequate geo-climatic conditions, high yield crop varieties, research and development complemented with unswerving state intervention pushed Haryana towards agricultural prosperity. In the following years, the state achieved remarkable success in per hectare production and helped India in achieving self-sufficiency in food grains especially in rice/paddy[1] and wheat. At present more than 80 per cent of the total land in the state is under sustained agriculture of which nearly 83 per cent land is sown more than once. The contribution of the primary sector stood at 17 per cent of the Gross State Domestic Product (GSDP) in 2015-16 and is expected to grow further in 2016-17 (Indian Council of Agricultural Research 2017, Statistical Abstract of Haryana 2015-16). Within the primary sector the share of crops (excluding livestock, fishing, forestry and aquaculture etc.) is 55 percent and it constitutes nearly 10 per cent of the total GSDP.

Among the majorly of the grown crops are wheat, rice, sugarcane, cotton, oilseeds, gram, barley, corn/maize, millets, fruits and vegetables. However, recent trends in agriculture witnessed a multifold shift towards paddy and wheat specialisation in Haryana. The production of paddy has increased by 10.44 per cent during the period 2010-11 (3,628 units[2]) and 2014-15 (4007 units). Between 2009-10 (1206.4 units[3]) and 2014-15 (1277.9 units), total area cropped under rice increased by 5.9 per cent. During the same period production of wheat grew by 5.64. per cent[4] (Statistical Abstract Haryana, 2010-11 & 2015-

[1] Paddy and rice have been used interchangeably across the successive chapters of this report.
[2] Thousand tonnes.
[3] Thousand hectares.
[4] 2488 thousand tonnes in 2009-10 as compared to 2628 thousand tonnes in 2014-15.

16). Availability of high yielding seeds, chemical fertilizers, well connected irrigation facilities, improved road networks, opening of new markets and relatively secured per acre yield and minimum support price (MSP) have promoted crop specialization to a significant level (Tuteja 2015).

However, the mounting specialization of paddy and wheat has shown adverse impact on soil health and future agricultural output (Ghuman and Sharma 2016). Environmentalists and agriculture experts warn of grave consequences in the coming times, if the practice of cultivating paddy and wheat specialization persists in the state. Studies confirm that persistent and repeated mono-cropping leads to soil degradation and subsequent loss in its retention capacity. Excessive irrigation and unrelenting use of pesticides have resulted in steady deterioration of ground water level and soil fertility (Gill 2016, Ghuman 2017). Also, rice and wheat monopoly has reduced the leguminous pulses from the state agriculture scene. The increasing replacement of traditional crops such as maize, jowar and bajra not only disturbed the dietary habits in rural areas, but also raised economic constraints on poor and marginalised people by abstaining them from obtaining affordable sources of nutrition. The unabated use of pesticides and fertilisers has been causing serious health problems to the farmers and consumers as well.

Agricultural Index points (AIP) show that production of all commodities (food + non-food) has increased from 104.8 to 115.65 during 2007-08 to 2013-14. In the corresponding period, AIP of non-food commodities increased from 102.17 to 109.62 (Haryana Statistical Abstract 2014-15). It suggests that the increase in production of non-food commodities does not increase proportionately to overall increase in agricultural production. Keeping in view of the ever increasing crop specialisation in the state, the Government of India and Government of Haryana have been endeavoring in the recent years to provide food security through ecologically sustainable and economically viable diversification of agriculture and promotion of scientific planning and cropping pattern to improve the yield per hectare by better and integrated crop management. The intensity of diversity is reflected by the number of crops produced in a state as well as by the aggregate level of spread or concentration. At the individual level diversification of agricultural crops

is supposed to increase the income level, at the regional level it is expected to mitigate negative externalities associated with mono-cropping, as well as at the national level it is perceived to help gain self-sufficiency in variety of agricultural produce. State-wise pattern of diversity on the basis of a 30 Crops Index reveal that most of the states in the northern region fall under the category of states producing less number of crops and hence are less diverse. Haryana falls in the category of moderately diversified cropping state with 15 points.

In recent years, Haryana has introduced progressive agricultural schemes to boost sustainable growth in agriculture. There are over three dozen schemes aimed at agricultural development in Haryana which are being implemented by the state directly or in collaboration with the central government. Major thrust of these schemes and policies are to make agricultural production more sustainable, remunerative and climate resilient by promoting location specific integrated/composite farming. For instance, the objective of the Scheme for Promotion of Crop Diversification is to promote the alternate crops like summer moong, sunflower and maize in order to reduce wheat and paddy crop rotation. Cultivation of rice and wheat over a prolonged period has caused degradation of natural resources to a great extent.[5]

The major rationales for promotion of crop diversification are as follows:

a.) due to extensive specialised cultivation ground water table has significantly deteriorated;

b.) government procurement agencies are facing challenge in procuring and storage of conventional cereals;

c). central agencies are not able to procure 100 percent wheat and rice based on MSP;

d) due to high dependence on import to meet the shortage of pulses and edible oil seeds etc.; and

e.) change in consumption pattern especially among middle and high income groups.

[5]Brief description of schemes for the year 2015-16, Government of Haryana.

Objectives of the Study

Against this background, the present study has been conducted to assess the prospects and challenges as also to evaluate the success of diversification of agricultural crops in Haryana. The present study postulated the following objectives keeping in mind that the changing cropping pattern is thought to be determined by the interactive effects of several factors:

1. to access the status and magnitude of crop diversification in the state;
2. to analyse the impact of physical, socio-economic and technological factors on crop diversification;
3. to analyse the status of utilization of cropping intensity and crop diversification schemes accessible to all categories of farmers;
4. to study the feasibility of changing crop patterns in respect of improvement in productivity of other crops in rotation;
5. to examine the impact of input and resource-related factors like irrigation, rainfall, soil fertility and availability of high yielding seeds and fertilizers on crop diversification;
6. to study the farmers' perception on institutional and infrastructure related challenges in the process of diversification of crops; and
7. to critically study the viability of cropping diversification related to house hold requirements including food and fodder self-sufficiency requirement, investment capacity; training of farmers, storage and processing.

Sample Organisation and Size

The study aimed at assessing the determinants, prospects and challenges as also to evaluate the success of diversification of agricultural crops in Haryana in general and evaluation of Crop Diversification Program (CDP) 2016-17, in the Original Green Revolution Districts of Haryana in particular where CDP was rolled out. These districts were Yamunanagar, Ambala, Karnal, Kurukshetra, Kaithal, Panipat and Sonipat in agro-climatic zone I[6] and Jind Fatehabad, Sirsa in agro-climatic zone II. Apart from the secondary sources, the study needed evidence from the field for which an intensive field survey was

[6] For more information on agro-climatic zones, refer chapter II.

conducted in ten sampled villages in the districts of Yamunanagar, Kurukshetra, Kaithal, Fatehabad, Sirsa and Sonipat. These districts were selected on the basis of average of paddy and wheat concentration which has been discussed in detail in the chapter IV.

The purpose of choosing ten villages through the above mentioned method is to study the level, reason, prospects and challenges of crop diversification longitudinally and horizontally and to locate the current trends in crop diversification, and to seek factors endorsing the ensuing trends. The state of Haryana as compared to many other states is geographically relatively uniform.

Although the study proposes to cover ten villages, it has state-wide relevance. The justification for selecting these villages lies in the fact that these villages represent the level of crop diversification at all levels representing the entire state as a sample.

A combination of probability and non-probability sampling methods including random, stratified random, purposive and snowball sampling have been used for the purpose of generating holistic information for the study. Villages were selected randomly with the help of personnel of Department of Agriculture of the respective Districts of Yamunanagar, Kurukshetra, Kaithal, Fatehabad, Sirsa and Sonipat. Further, thirty farmers in each of the sampled villages (total one hundred and eighty farmers) were chosen for interview based on a stratified layers of their land holding sizes ranging from marginal, small, medium to large. Informal interactions and interviews were conducted to a number of officials from department of agriculture including Deputy Directors (Agriculture), ATMs (Assistant Technology Manager), TA (Technical Advisors), Block Officers, Agriculture Development Officers, Quality Control Inspectors; Members of Village Panchayat, Village Level Voluntary Groups, Members of Farmer's Associations, Farm Entrepreneurs, Agricultural Experts, Academicians, Trader, Manufacturers of agricultural implements and Labourers etc. In this way the sample size of the present study went beyond the originally stipulated 234 samples and tried as much as possible to cover a vast range of views and information from different stakeholders.

Methodological Approach

The study followed both quantitative and qualitative methods for an extensive analysis of the issue at hand and to arrive at the concluding observations. Structured and semi structured schedules with both open and closed ended questions were used to gather both quantitative and qualitative data. Interviews were conducted with the target population as mentioned above. One to one interviews and Focus Group Discussions (FGDs) were also held comprising the research team, government officials and the various categories of respondents. The filled-in questionnaires were coded with the support of the data experts and field investigators.

Thus, the report highlights various aspects of geographical variations, issues, prospects and challenges in crop diversification in the state with plausible trends. The report is prepared in a precise manner so as to help policy makers to identify specific issues and challenges and take concrete steps towards the success of crop diversification in Haryana.

Chapter II

Status, Trend and Impact of Mono-cropping in Haryana

Overview of Crop Intensity

The share of agriculture in the SGDP rose significantly in the subsequently years, as discussed in the previous chapter, and a larger share of SGDP is derived from agro-based farming, horticulture, agro-forestry and dairy based sectors (Haryana State Agricultural Policy 2014: 3). Paddy, wheat, sugarcane, cotton, oilseeds, gram, barley and millet contribute to the state's repute of being ranked as the second largest food basket of India. Among others, however wheat and paddy remain the major crops.

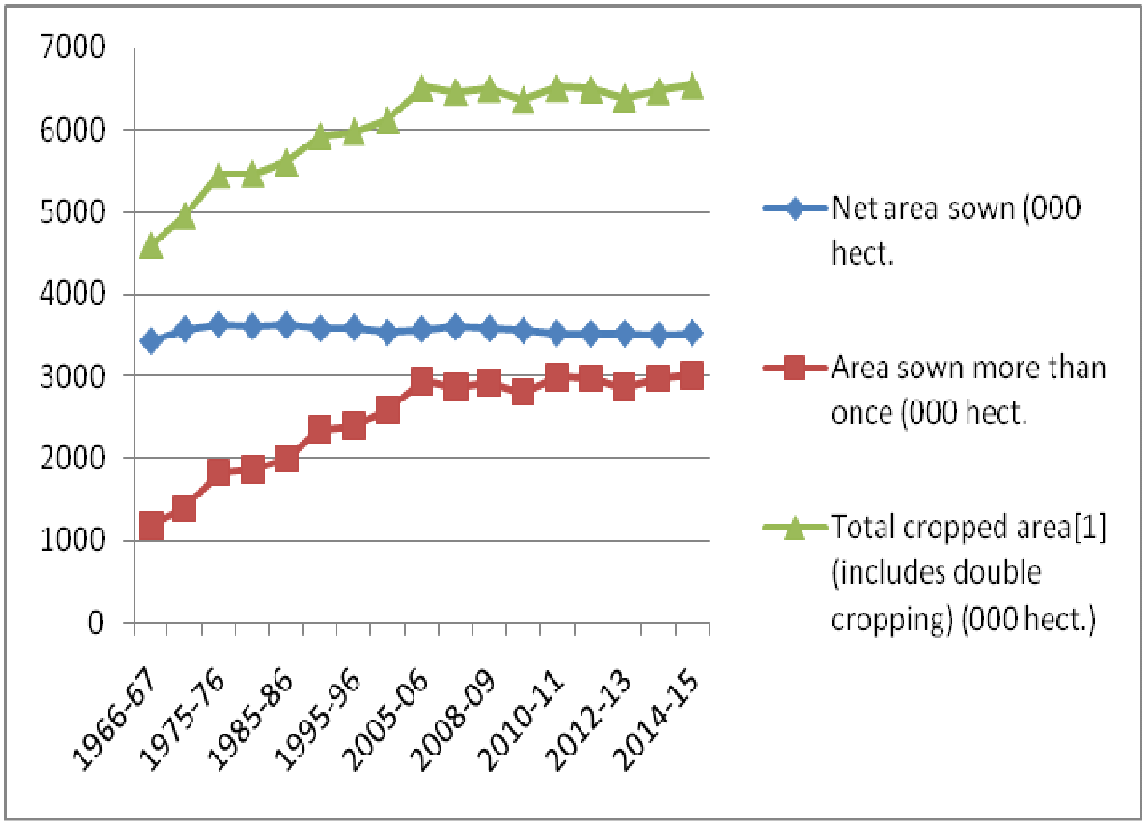
Table – 2.1: Trend of crop intensity in Haryana (000 hectares)

Year	Net area sown	Area sown more than once	Total cropped area[1] (includes double cropping)
1966-67	3423	1176	4599
1970-71	3565	1392	4957
1975-76	3624	1827	5451
1980-81	3602	1860	5462
1985-86	3613	1988	5601
1990-91	3575	2344	5919
1995-96	3586	2388	5974
2000-01	3526	2589	6115
2005-06	3566	2943	6509
2007-08	3594	2864	6458
2008-09	3576	2924	6500
2009-10	3550	2801	6351
2010-11	3518	2987	6505
2011-12	3512	2976	6489
2012-13	3513	2863	6376
2013-14	3497	2974	6471
2014-15	3522	3014	6536

Source: Statistical Analysis of Haryana (various years)

[1] According to Statistical Abstract of Haryana - Total Cropped area includes total area covered with crops during the year. In case, different crops are raised on the same land during the year, the same area is counted more than once.

Favorable physical conditions, integrated state and farmers' efforts to introduce improved farming techniques have yielded favorable returns. As also, the total area under cropping in Haryana has witnessed overwhelming rise after the decades of 1960s. The growth curve since past 49 years illustrates a cumulative growth of 1.937 million hectares into agriculture practice.



The above table shows that in the last five decades there has been a significant rise in the area brought into intensive agricultural usage. Since 1966-67 to 2014-15, the net area sown grew by 2.89 per cent whereas area sown more than once grew phenomenally by 156 per cent. Similarly, with the onset of green revolution cropping concentration intensified. The trend of crop intensity is still continuing, however, it has reached to almost saturation level of 85 per cent of the net cropped area of the state.

Agro-climatic zones of Haryana

Source: Haryana State Agricultural Policy 2014:3

On the basis of prominent ecology and suitable cropping pattern, Haryana Kisan Ayog (Haryana Farmers Commission), Government of Haryana, has classified the State into three major agro eco-zones/agro-climatic zones. Zone-I comprises Ambala, Panchkula, Yamunanagar, Kurukshetra, Kaithal, Panipat, Karnal and Sonipat; Zone-II covers district Rohtak, Faridabad, Palwal, Jind, Hisar, Fatehabad and Sirsa. Zone-I and II are adequately equipped with agricultural infrastructure and irrigation facilities and ideal for growing wheat, paddy, pulses, cotton and sugarcane as well as for raising dairy cows, buffaloes and poultry. However, Kandi area in these zones have serious problem of soil and water erosion and hence they are suitable for agro-forestry and agro-horticulture systems. District Jhajjar, Gurugram, Nuh (Mewat), Rewari, Mahendragarh and Bhiwani cover the remaining 29 per cent clubbed under Zone-III. The arid climate in the region support oilseeds such as mustard, rapeseed and pearl millet and is also suitable for arid-horticulture. The region has vast scope for animal husbandry, for instance, Mewat area is more suitable for agro-forestry, sheep and goat rearing however, with no or limited scope of crop intensity. (Haryana State Agricultural Policy 2014: 2-3).

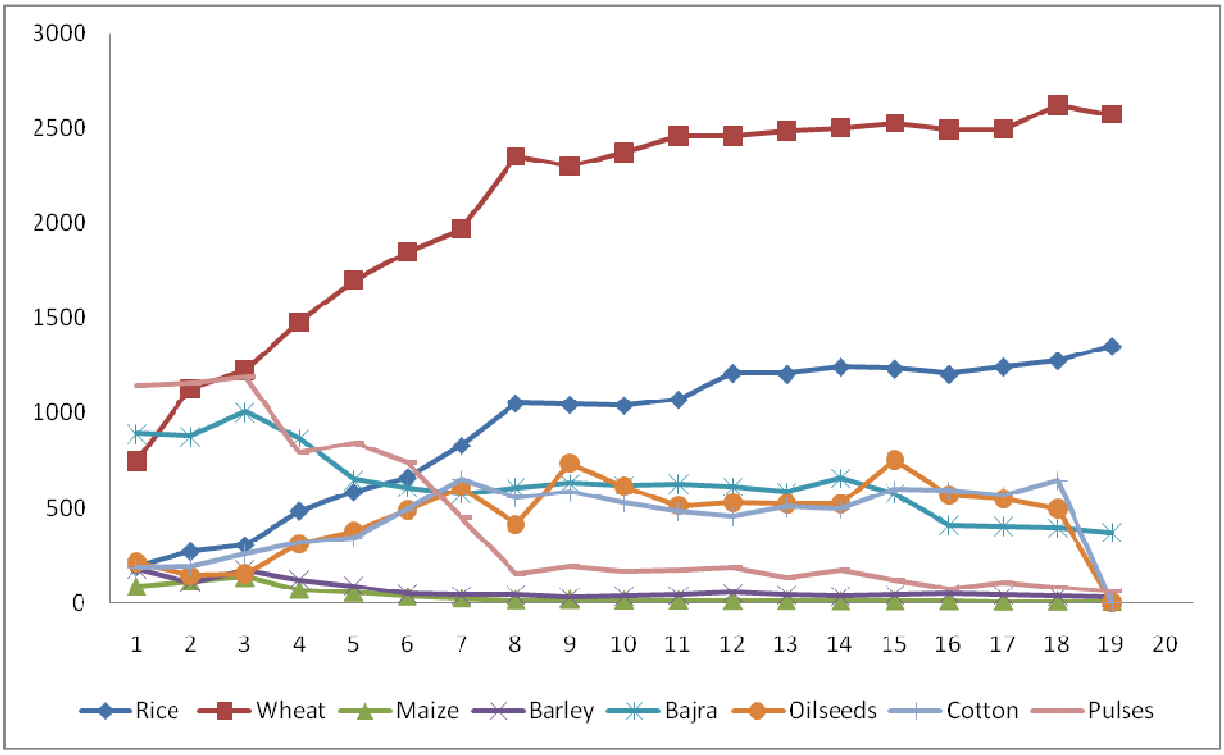
Mono-cropping in Haryana

During the initial years of green revolution (1966-80) food grain production in Haryana increased at 5.33 per cent compound rate of growth, as compared to the national average of 2.77 per cent. Paddy and wheat grew by 12.47 per cent and 8.93 per cent respectively, whereas pulses and oilseeds registered a fall of 5.12 per cent and 0.64 per cent respectively during the same period. Modern methods employed for commercial farming raised the overall agricultural inputs as compared to traditional farming but with rapid commercialization of agriculture and shift to modern farming methods led by expensive agricultural implements/equipments, hybrid seeds, chemical fertilizer, pesticides came along with multiple risk variables. Flat rate subsidized electricity for water lifting, increasing MSP for paddy and wheat inspired extensive mono-cropping have been asserted as major culprits contributing towards the depletion of groundwater levels, excessive use of chemical fertilizers and pesticides resulting into negative impacts environmental and human health (Sangwan 1985, Ghuman 2017, Shah and Chowdhury 2017).

Table-2.2: Total Cropped Area (000 hectares)

Year	Rice	Wheat	Maize	Barley	Bajra	Oilseeds	Cotton	Pulses
1966-67	192	743	87	182	893	212	183	1150
1970-71	269.2	1129.3	114.4	108.6	879.6	142.6	193.4	1158.9
1975-76	303.5	1226	138.7	177.1	1005.6	153.5	255	1193.9
1980-81	483.9	1479	71.3	124.5	870.3	311.2	316.2	794.8
1985-86	584	1701.3	54.9	87.7	649.5	380.1	344.1	846.3
1990-91	661.2	1850.1	34.8	50.5	608.6	488.5	490.6	742
1995-96	830	1972.1	26	40.6	575.2	611.0	651.8	449.8
2000-01	1054	2354.8	15.4	44.1	608.3	414	555.4	157
2005-06	1046.6	2302.7	17.5	28.2	631	735.8	583.8	195.3
2006-07	1042	2377.1	13.4	37.7	619	616.2	527.7	169.3
2007-08	1072.5	2460.7	13.8	39.5	628	511.3	482.5	172
2008-09	1211.2	2461.4	11.8	53	612.9	527.6	456.1	184.1
2009-10	1206.4	2487.7	12.2	42.1	583.8	523	505.1	131.6
2010-11	1243.3	2504	9.6	37.3	659.6	521	493.3	175.6
2011-12	1234.1	2531.3	11	41.2	576.2	754.8	601.8	123
2012-13	1206.3	2496.9	9.9	47.7	410.7	567.6	592.6	75.3
2013-14	1244.6	2499.1	8.5	38.6	403.6	548.5	567.8	105.3
2014-15	1277.9	2628.1	8.8	35.3	393.8	495.4	647.2	83.8
2015-16	1354	2576	6	29	370	NA	NA	61.8

(Source: Statistical Abstract of Haryana, various years)



The table no. 2.2 shows negative correlation between the cropping pattern of various crops in the state. Between 1966-67 to 2014-15, paddy, wheat, oilseeds and cotton have recorded a positive growth with an addition of 3742 thousand hectares under cultivation whereas 1793 thousand hectares of land previously cropped under maize, barley, bajra and pulses has been reduced. Therefore, total cropped area and overall production of various crops in Haryana reflect consistent expansion and dominance of paddy and wheat in the state. On the other hand, barley, bajra, oilseeds, maize, cotton and pulses have witnessed drastic downfall in the overall production and total area cropped throughout the last forty nine years. Any crop failure (low yield or flat market prices) disturbs the input-output ratio thus pressurizing the farmers to opt for climate resistant crops. Inherent risk factors such as poor monsoons, pest attack, inappropriate procurement and price shock restrain farmers of the state to switch from paddy and wheat to alternative crops.

In 2014-15, 77.24 per cent of the total crops grown[2] in Haryana comprised of paddy, wheat, oilseeds and cotton; total area cropped under paddy and wheat (59.76%) dominated oilseeds and cotton (17.48%). (Statistical Abstract of Haryana, 2015-16). The findings of the field survey, which have been discussed at length in successive chapters, have also confirmed the above mentioned concentration of paddy and wheat cultivation of the total cropped area. The traditional crops such as maize, barley, bajra and pulses form 7.92% of the total cropped area. With the introduction of high yield crops, mechanization of agriculture, fertilizers and improved irrigation the production of paddy and wheat has multiplied manifold during the past 48 years. There is a surge of 947% in the overall production of paddy and wheat in the state and an overall decline of 32% has been recorded in the production of maize, barley, bajra and pulses between 1966-67 and 2014-15.

Table- 2.3: Total Production (000 tonnes)

Year	Rice	Wheat	Maize	Barley	Bajra	Oilseeds	Cotton	Pulses
1966-67	223	1059	86	239	373	92	287	563
1970-71	460	2342	130	124	826	98.8	373	832
1975-76	625	2428	171	221	608	79.4	465	952
1980-81	1259	3490	81	181	474	187.5	643	502.5
1985-86	1633	5260	64	160	315	287.8	745	686.6
1990-91	1834	6436	49	107	526	638	1155	541.7
1995-96	1847	7291	48	100	409	783.1	1284	450.7
2000-01	2695	9669	34	118	656	562.8	1383	99.8
2005-06	3194	8853	36	79	706	822.1	1502	111.8
2006-07	3375	10059	30	115	1021	821.2	1805	136
2007-08	3606	10232	37	120	1156	617.2	1882	101.1
2008-09	3299	11360	25.2	185	1087	911.5	1862	177.6
2009-10	3628	10488	26	137	930	862	1918	97.3
2010-11	3465	11578	19	130	1183	964.9	1747	153.1
2011-12	3757	13119	30	149	1175	545.8	2621	107
2012-13	3941	11117	26	167	791	970	2378	285.6
2013-14	4041	11800	24	151	829	899.1	2025	90.9
2014-15	4007	10707	18	105	670	739.5	1943	54.5
2015-16	4145	11352	17	99	652	NA	NA	40.1

(Source: Statistical Abstract of Haryana of various years)

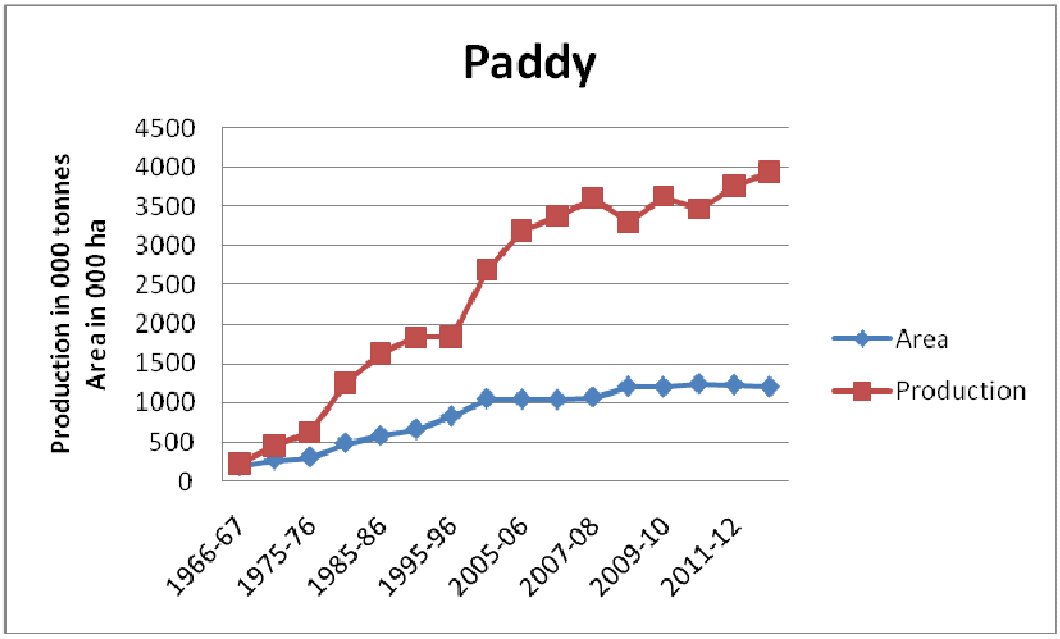
It may be noticed that price of pulses in India is vulnerable and volatile. In case of a crop failure, the prices shoot up while during a good harvest the prices land a touchdown. In

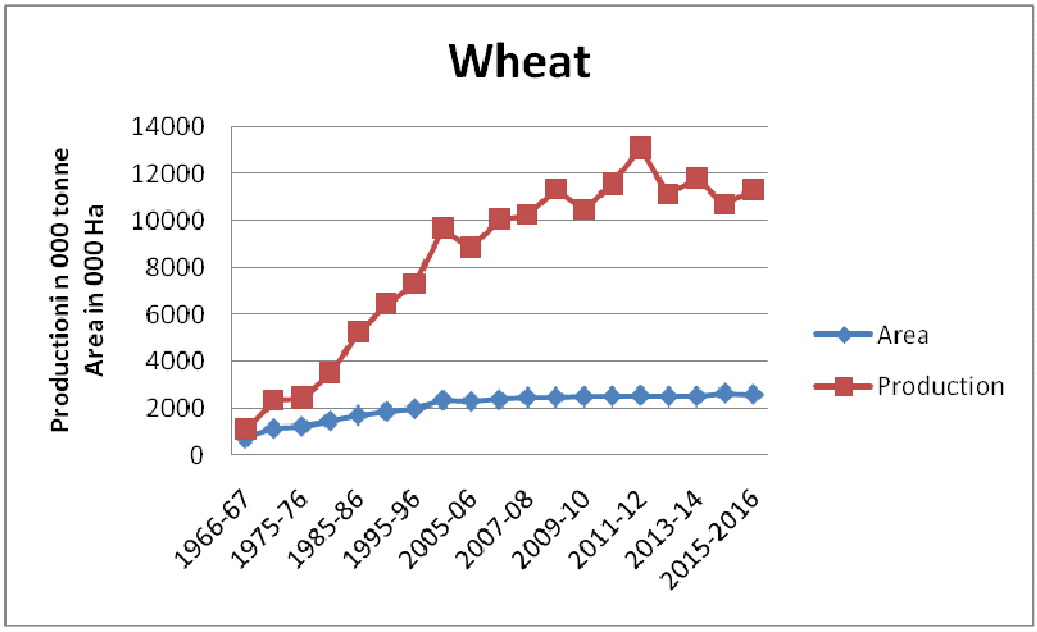
[2] Total Cropped area in Haryana = 6536 thousand hectares (SAH 2015-16)

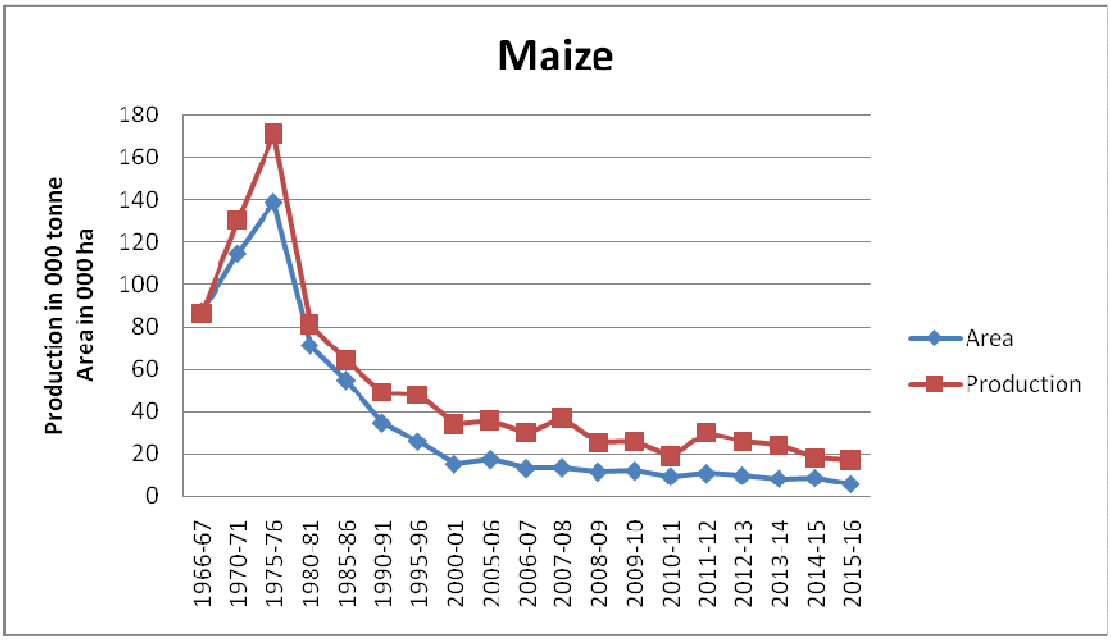
Haryana 'the acreage under gram and rapeseed/mustard seed is positively and significantly associated with price but insignificantly related with yield and perhaps this explains the paradox of increasing prices but declining proportionate areas under pulses and oilseeds in the cropping pattern'. The market factors (natural/manmade) have functioned to control the flow of pulses (Sangwan 1985: 184, Ghosh 2017).

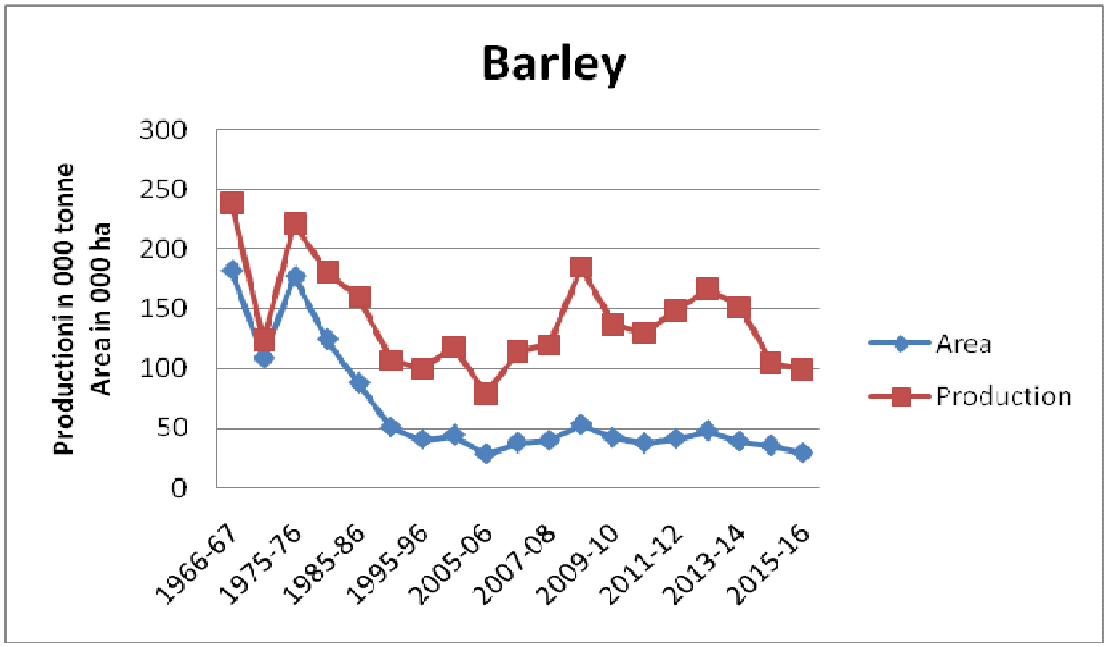
The variability in yield has affected the total area under groundnut, rapeseed/mustard seed and jowar. In both the cases farmers are not able to reap the best out of growing pulses and have thus shifted to other crops. The irregularities in output and lack of safety nets hinder farmers to deflect wheat and rice rotation. It is thus required to stabilize the price and gradually increase the yield with suitable seed varieties of groundnut, rapeseed/mustard seed and jowar.

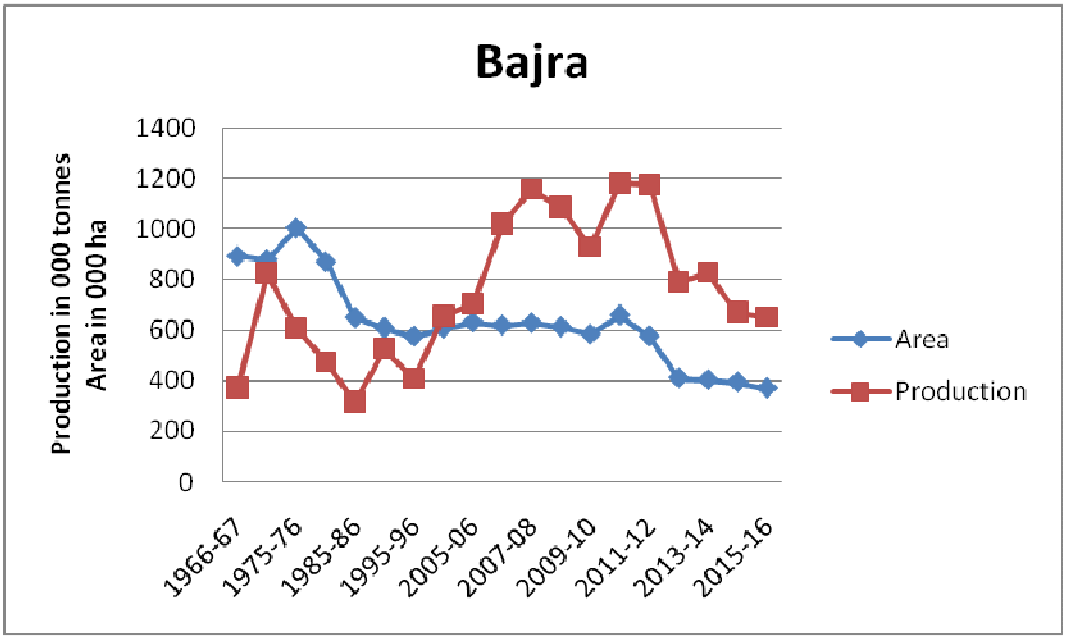
Figure-1: Crop-wise variation in Total Cropped Area and Production in Haryana

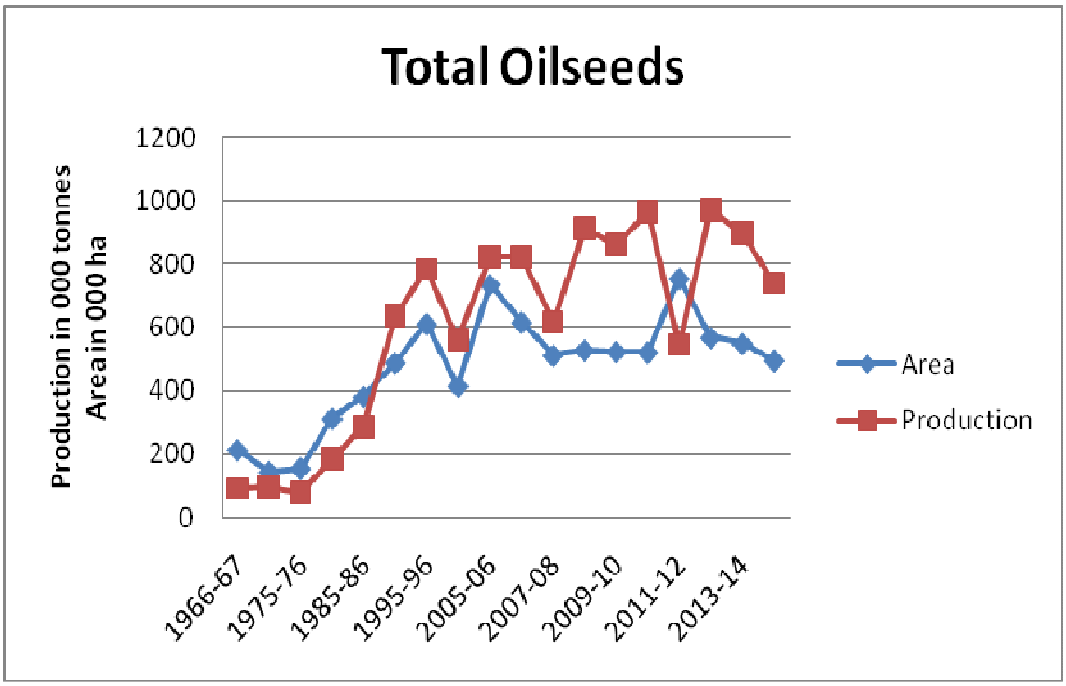


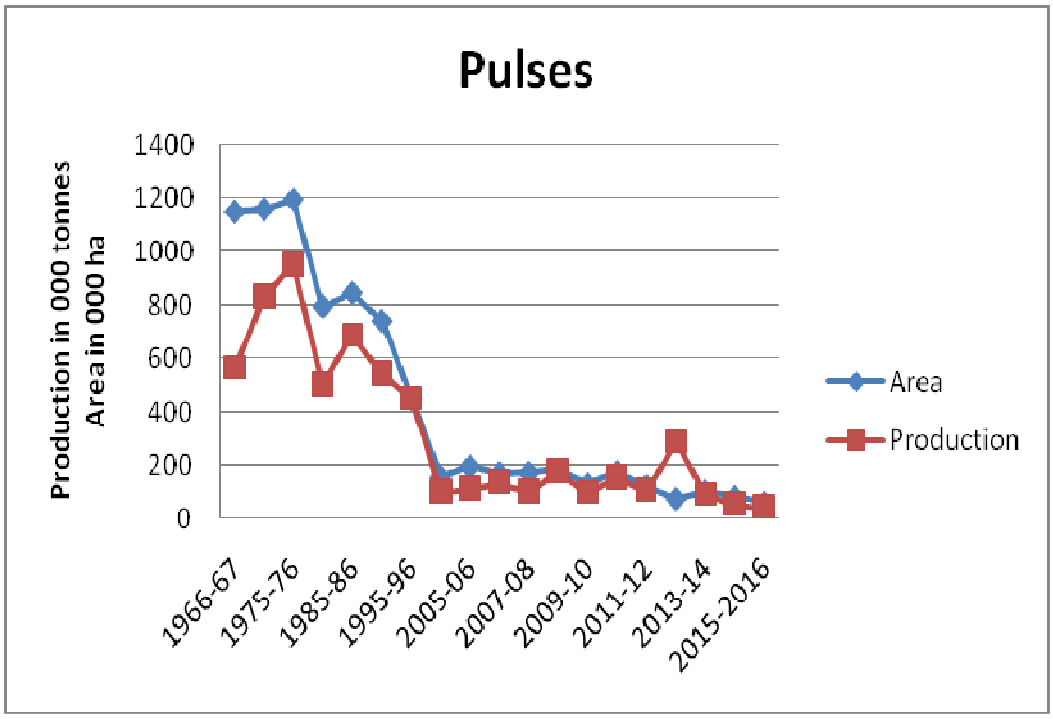

Wheat
Productioni n 000 tonne
Area in 000 Ha
14000
12000
10000
8000
6000
4000
2000
0
1966-67
1975-76
1985-86
1995-96
2005-06
2007-08
2009-10
2011-12
2013-14
2015-2016
Area
Production

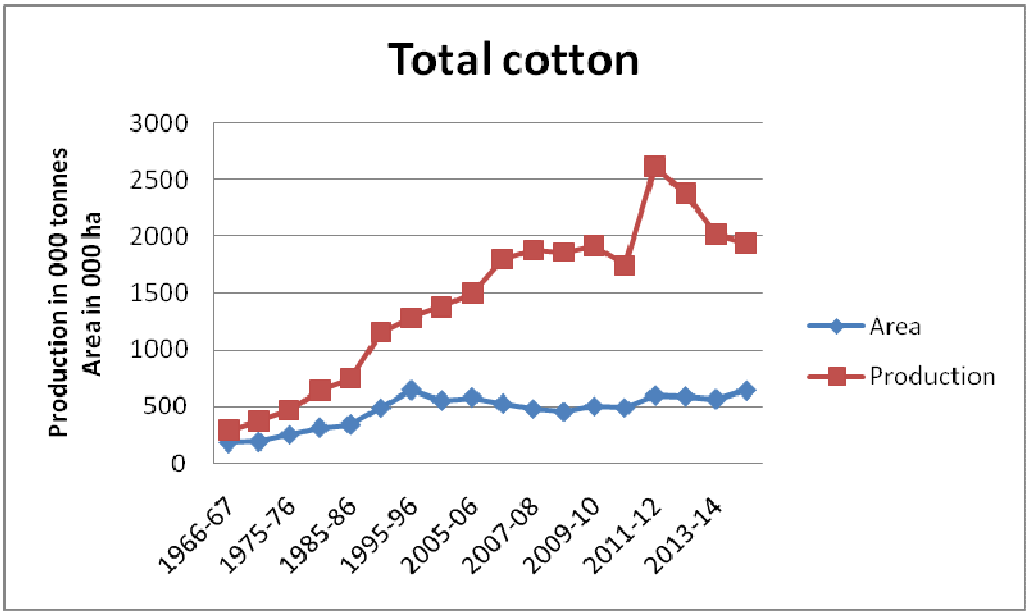

Maize
Production in 000 tonne
Area in 000 ha
180
160
140
120
100
80
60
40
20
0
1966-67
1970-71
1975-76
1980 81
1985-86
1990-91
1995-96
2000-01
2005-06
2006-07
2007-08
2008-09
2009-10
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
Area
Production


Barley
Productioni n 000 tonne
Area in 000 ha
300
250
200
150
100
50
0
1966-67
1975-76
1985-86
1995-96
2005-06
2007-08
2009-10
2011-12
2013-14
2015-16
Area
Production


Bajra
Production in 000 tonnes
Area in 000 ha
1400
1200
1000
800
600
400
200
0
1966-67
1975-76
1985-86
1995-96
2005-06
2007-08
2009-10
2011-12
2013-14
2015-16
Area
Production


Total Oilseeds
Production in 000 tonnes
Area in 000 ha
1200
1000
800
600
400
200
0
1966-67
1975-76
1985-86
1995-96
2005-06
2007-08
2009-10
2011-12
2013-14
Area
Production


Pulses
Production in 000 tonnes
Area in 000 ha
1400
1200
1000
800
600
400
200
0
1966-67
1975-76
1985-86
1995-96
2005-06
2007-08
2009-10
2011-12
2013-14
2015-2016
Area
Production



(Source: Statistical Abstract of Haryana 1966-2015)

The paradigm shift to rice and wheat specialization has helped India secure self-sufficiency in food production and also making her a major global leader in grain export. However, constant mono-cropping degrade the overall soil fertility; and thus affecting the yield quality of other crops as well. A recent report by Ministry of Finance reveals that in 2014-15 and 2015-16, India faced a 'pulses crises', the productivity of the pulses dropped due to weak monsoons, causing a sudden surge in the demands and inflation in consumer price. 'High prices in the pre-Kharif sowing period and a good monsoon led to a sharp increase in acreage under pulses. In anticipation of this positive supply shock (in India and overseas where too supply has surged), prices started plummeting. The report recommends appropriate and immediate increase in MSP for pulses to ensure sustainable and long term benefits to farmers and the consumers. Crop diversification is a possible breakthrough to overcome the plummeting agricultural economy and help soil retain its fertility (Ministry of Finance, 2016).

The implications of such fluctuation are dire for farmers and their livelihoods because in Haryana total cropped area under pulses in 2010-11 was 175.6 thousand hectares and production was 153.1 thousand tonnes. On a declining trend total area cropped under

pulses and production stood at 123 thousand hectares and 107 thousand tonnes respectively. The acreage further slipped in 2012-13 to 75.3 thousand hectares but production rose to 285.6 thousand tonnes. In 2013-14 the acreage again rose to 105.3 thousand hectares with lowest ever production of 90.9 thousand tonnes (Statistical Abstract of Haryana, 2014-15: 226-27).

Between 2009-10 and 2014-15, the overall production in horticulture[3] recorded a growth of 37.83%. The area cropped under horticulture varieties witnessed a growth of 20.67% during the same period (Horticulture Department Haryana).

Table – 2.4: Trend of Horticulture crops in Haryana

Year	Area (hectares)	Production (tonnes)
1966-67	19170	162887
1970-71	35054	289073
1975-76	54418	434992
1980-81	63220	680050
1985-86	70809	657437
1990-91	68050	902907
1995-96	115760	1568015
2000-01	181115	2491035
2005-06	277479	3298089
2006-07	328601	3712724
2007-08	326296	3622575
2008-09	355515	4264844
2009-10	364375	4457585
2010-11	415930	5149290
2011-12	429968	5711597
2012-13	436549	5696662
2013-14	450605	6295025
2014-15	439605	6144328

(Source: Horticulture Department Haryana)

Irrigation Pattern in Haryana

Irrigation through canals was prioritized in Haryana, since 47% of the area in the state has brackish underground water (Irrigation Department Haryana). The Haryana Canal

[3] Includes fruits, vegetables, medicinal and aromatic plants, spices and floriculture.

and Drainage Act, 1974[4] came in to existence approving 59 main canals, minor canals and 1326 distributaries spread over a network of 12328 km to supply surface irrigation to 3.048 Million hectares of agricultural land. Nearly, 36.12% of the net sown area in Haryana is irrigated by canals (Mangat 2016: 53). The state receives water for irrigation through 4 main canal systems:

(i). Bhakra canal system irrigates 1.383 mha (million hectares) Cultural Command Area (CCA[5]) in north-western and western parts of the state. The canal enters Haryana at Tohana and irrigates large parts of Hisar, Fathehabad and Sirsa.

(ii). Western Yamuna canals system irrigates CCA of 0.970 Mha in the north-eastern and central parts. Parts of Kurukshetra, Karnal, Sonepat, Rohtak, Jind, Hisar, Sirsa, Fathehabad and Bhiwani districts benefit from the canal system.

(iii). Gurgaon canal and Agra canal systems: it irrigates parts of Gurugram and Faridabad.

(iv). Lift canal system (Irrigation Department Haryana): The Jui, Sewani, Loharu and Jawahar lal Nehru lift irrigation schemes irrigate Bhiwani and adjoining areas.

There is a continuous belt of high level of canal irrigation covering central and north-western districts of Haryana such as, Jhajjar, Rohtak, Sonipat, Jind, Hisar, Fatehabad and Sirsa districts. North-western districts of Haryana have brackish water aquifers as a result underground water is unfit for tube well irrigation. Therefore, canal irrigation is a necessary even at the risk of water logging in these areas (Mangat 2016: 54-55).

Due to the controversy with Punjab over the Sutlej-Yamuna link, the state could not receive adequate water for irrigation. However, under Haryana Water resources Consolidation Project 1994-95, to improve equitable water distribution an extensive network of tube wells have been set up in the state. Despite reported brackishness, subsidized electricity supply pushed a large scale lifting of ground water in agriculture. Water guzzling crops such as paddy have thus gained popularity among the state farmers. The salinity and Ph levels of the soil and water and its suitability for agricultural purposes has been

[4] Government of Haryana http://hid.gov.in/canalact.pdf

[5] T hat portion of a culturable irrigable area which is commanded by flow or lift irrigation from an irrigation channel, outlet or State tubewell (http://hid.gov.in/canalact.pdf pp3)

questioned time and again. Water logging and salinity has been a major problem in the state (Gulab 2014).

Table: 2.4 Paddy Cultivation and Number of tube-wells in Haryana

Year	Area Under rice (000 ha)	Total Cropped area (000 ha)	No of tube wells per 1000 ha of cropped area
1970-71	269.2	4,957	21
1980-81	483.9	5,462	60
1990-91	661.2	5,919	84
2000-01	1054	6,115	96
2010-11	1243.3	6505	111
Growth % since 1970-71	361.84	31.22	428.57

(Source: Mangat 2016: 55)

The number of tube wells and pumping sets per 1000 hectares of the total cropped area in the state has increased by 653 percent over the same period. The rising cultivation of paddy in the state indicates at a positive correlation with the rising number of tube wells. Approximately 3500 liters of water is consumed (directly or indirectly) to produce 1 kg rice (WWDR 2012). The shift from traditional to commercial crops has given rise to big numbers that reflect upon unsustainable means of producing food surplus. Due to this fixation especially with paddy, farmers reported, during the field visit for this study, that due to dwindling water table many of them replace their existing submersible pumps after every three to four years with more powerful and expensive pumps. It was also reported that Direct Seeding Rice (DSR) method failed to attract the interest of farmers at large scale due to purported minimal saving of water and undependable productivity.

Adverse impact of Paddy and Wheat mono-cropping

The Green revolution in India introduced high yield crop varieties, mechanized agriculture, large scale irrigation through canals/tube wells and an extensive use of chemical fertilizers and pesticides (Dhanagre 1987). In the race towards surplus production the original green revolution states inadvertently adjusted towards paddy and wheat mono cropping. As a result the farm infrastructure and market mechanisms have specialized in accordance to rice and wheat. As a result alternative crops such as maize, oilseeds, jowar, barley and cotton took the brunt of paddy-wheat dominance in Haryana. Extensive flooding

of fields and excessive use of chemical fertilizers and pesticides deteriorated soil quality and ground water table in the state.

The states of Punjab and Haryana have become water scarce after the green revolution (Gill 2016). According to Central Ground Water Board, Government of India the Status of Ground Water Development is 114% in Haryana, which is comparatively high. The value implies overconsumption of water as compared to the natural rate of groundwater recharge. The report infers that out of 108 blocks, 55 blocks are over-exploited, 11 blocks are critical and 5 are semi-critical (Government of India).

The Haryana Kisan Ayog reports that 'About 65% of ground water of Haryana is of poor quality' and the second generation problems of green revolution in the state have caused a steep decline in resource base, soil degradation (soil compaction, soil salinity, sodicity, water logging, and pesticide residue) and reduction in soil organic carbon content, hydrological imbalance, that have increased the overall cost of cultivation. The report records an increase in pollution of soil, water and environment (Haryana Kisan Ayog Report 2014: 2). It is crucial that air pollution in Punjab and Haryana have significantly increased due to paddy stubble burning. Crop residue burning (CRB) is a major health hazard known to contribute 12-60 per cent of Particulate Matter (PM) concentration in to regional environment. Burning of paddy straw pilfer essential ingredients such as nitrogen, sulphur, phosphorus and potassium from the top-soil and reducing its productivity (Mukherjee 2016). A small window of time between paddy harvesting and sowing of wheat crop is one factor that pushes farmers to opt for a cheap and easy option to dispose-off paddy straw. Secondly, the entire process of to removing the paddy straw is labor intensive or requires specialized farm implements; the availability of labors in the state have declined significantly and implements available in the market are beyond an average farmers reach despite subsidy offered by the government.

Social inequity in access to infrastructure (suitable land, irrigation facilities and high yield seed varieties), economic boundaries of class and caste and gaps in policy implementation and availability of better options have led a major shift from agriculture to

other work sectors. The scarcity of field laborers has triggered overall increase in agricultural input cost. In the long run the agricultural productivity and output has decreased in Haryana. Rice productivity has become stagnant and is on the verge of a production crisis. Total factor productivity (TFP) growth in rice has been witnessing a negative trend; falling down by 0.07 per cent per annum in Punjab (Singh & Hussain 2002). Haryana Kisan Ayog reports, "The total factor productivity (TFP) is declining due to resource degradation, high cost of inputs & labor, natural calamities and gaps in technology. The continuous degradation of natural resources and intensive cultivation is affecting the sustainability of agriculture" (Haryana Kisan Ayog 2013: 18).

From the above discussion, it can be concluded that growing inclination towards paddy cultivation in the original green revolution States stirred collective apprehensions amidst social scientists, agriculture experts and policy planners. Studies reveal that excessive exposure to chemical fertilizers and harmful pesticides have bared the soil towards infertility and degradation. The bulk of water channels needed to irrigate paddy fields are also accountable to depleting water table in Punjab and Haryana (Singh 2000, Reddy 2011 and Shiva 2016). The domination of rice over maize, pulses and oilseeds has created an imbalance in the food supply and demand chain. Despite high market demands, the farmers have abstained from investing in pulses, mainly due to high risk quotient involved in diverting to secondary crops. The safety package appending paddy assures a comparatively lower risk of crop failure i.e. in the field and off the field.

Chapter III

Promotion of Diversification of Agricultural Crops in Haryana

Keeping in view of the need of diversification of agricultural crops in recent years, the Government of Haryana had devised several schemes and programmes while also addressing the ongoing market insecurities among the farming community. The Government of Haryana devised several schemes to promote crop diversification. Such initiative of the state generally target to boost maize production and replace paddy from the earmarked regions. The Cabinet Committee for Economic Affairs in June 2016 approved an increase in the Minimum Support Price (MSP) for all Kharif crops. MSP for Tur (Arhar) has been raised from Rs. 4625 in 2015-16 to Rs 5050 in 2016-17. MSP for Long staple Cotton increased from Rs 4100 in 2015-16 to 4160 in 2016-17 and that of medium staple cotton has been raised from 3800 to 3860 in the given time frame. The overall rise in MSP ranges 9.2 per cent for Tur (Arhar) and 1.5 and 1.6 per cent for long and short staple cotton respectively. (Press Information Bureau 2016). According to the State Agriculture Policy 2014, the state embarks to acquire value based additions and ascertain sustainable agriculture plan in its operation to delimit the detrimental consequences of mono-cropping in the state.

In this chapter, we will take a brief description of major schemes impinging on to crop diversification in Haryana in particular the 'Fasal Vividhikaran Karyakram' (Crop Diversification Program / CDP) of 2016-17 in the original green revolution state of Haryana along with a cluster of related schemes to promote crop diversification in the state.

Agricultural Schemes

The Haryana Kisan Ayog was established in 15 July, 2010 to look after the problems faced by farmers. The Commission ensures the availability of seeds, fertilizers, farming equipments at subsidized prices to the farmers to promote high productivity, fertility and profitable returns to farmers. Based on the recommendations of the Aayog, the state extends the subsidies through national schemes such as Rashtriya Krishi Vikas Yojana (RKVY),

Rashtriya Khadya Suraksha Mission (RKSM) and Rashtriya Bagwani Mission.

Under RKSM (National Food Security Mission) the state of Haryana extends a package of financial assistance for wheat and pulses respectively. Integrated Scheme of Oilseeds, Pulses, Oil-palm and Maize (ISOPOM), is another scheme targeted towards crop diversification. Under the scheme certified seeds, gypsum along with other micro nutrients, heavy and light farming equipments are availed at subsidized rates. In addition the state provides funds to run Farmer Field Schools to promote advanced farming methods and inculcate a sense of ownership among the farming community and foster an increased participation towards food security. In the same direction, the Haryana Krisan Ayog offers incentives to the farmers in form of cash prizes, conducts training camps, exhibitions, Krishi Mela (Agriculture fairs), and educational tours for farmers under Krishi Prodyodiki Pranbandh Agency (Agricultural Technology Management Agency-ATMA). A sum up to Rs. 5 lakh is awarded to best performing villages under Adarsh Krishi Gram**.** Cotton and sugarcane productivity missions are administered under Rashtriya Krishi Vikas Yojana. The construction of underground irrigation networks and sprinkler sets has also been subsidized by the state. In addition the state agriculture commission extends farmers' benefit through research and development, awareness drives, farmer trainings and crop insurance benefits to the farmers.

Policies and Initiatives

The State Agriculture Policy- 2014 of Haryana to alleviate the overall condition of farming in the state assured un-interrupted power supply (eight hours a day) to the farmers, promote horticulture and animal husbandry. The policy aims to bring in major reforms in agricultural economy by smoothening credit systems and bring in safety nets to safeguard the farmers growing vulnerable crops. The plan thrive impetus to increase crop productivity and reduce the existing gaps in policy and implementation.

In the early 2016, Agriculture and Farmer's Welfare Department Haryana, under the aegis of Pradhan Mantri Fasal Bima Yojana (PMFBY) notified 10 crops to be insured under Prime Minister Crop Insurance Plan. Cotton, paddy, bajra and maize during Kharif and

wheat, barley, mustard, gram during Rabi 2016-17 have been notified under the plan. The plan guarantees 'insurance coverage and financial support to the farmers in the event of failure of any of the notified crop as a result of natural calamities, pests & diseases to stabilize the income of farmers to ensure their continuance in farming to encourage farmers to adopt innovative and modern agricultural practices to ensure flow of credit to the agriculture sector'. (Pardhan Mantri Fasal Bima Yojna 2016). A 'special girdwari' (revenue survey) is to be conducted for any loss of crops, modern equipment and tools such as smart-phone and remote sensing technique shall be employed to ensure smooth functioning of the plan. Following an "Area Approach" the scheme covers all the districts under three clusters. Cluster-I comprises district Sirsa, Bhiwani, Faridabad, Kurukshetra, Kaithal, Panchkula and Rewari. In Cluster-II the districts of Hisar, Sonipat, Gurugram, Karnal, Ambala, Jind and Mahendergarh have been clubbed. Fatehabad, Rohtak, Jhajjar, Mewat, Palwal, Panipat and Yamunanagar fall under Cluster-III. The scheme assures protection of crops in case of the following four situations:

(i). In case the fluctuations in seasonal conditions (say poor rainfall) resulted in prevented sowing;

(ii). If the yield of a standing crop is largely affected due to non-preventable events such as drought, floods, inundation, pest and diseases, landslides, natural fire and lightening, dry spells, storms, hailstorms, cyclone, typhoons etc.;

(iii). Post harvest, loss incurred on harvested crop due to cyclone, cyclonic rain, unseasonal rains.

(iv). Localized calamity such as hailstorm, landslides and inundation that may have affected individual farms have been covered under the insurance scheme.

However, the crop insurance scheme do not contains under its purview the claims for crop damage due to wars, nuclear risks, malicious damage and other preventable risks, these have been clubbed as 'General Exclusions' (Haryana Government Notification 2016)

Pradhan Mantri Jan Dhan Yojana was launched in 2014 for financial inclusion and to empower the 67 per cent poor who did not had bank accounts and relied on expensive informal sources for loans. It has been estimated that by allowing the access to basic

banking facilities to the rural population might encourage them to opt for institutional credit systems instead of borrowing agricultural loans from the local moneylenders.

Haryana has become the first state in the country to distribute Soil Health Cards (2015) to the farmers. Soil samples collected from various districts are tested for their mineral composition. Based on scientific analysis of soil types in various districts, experts have devised suitable prescription to improve the overall yield. The cards distributed among the farmers help them better understand the soil types also recommending the best suitable practice for them. The scientific understanding of soil behavior if implemented properly shall help in crop diversification and also improve the overall yield of pulses, maize, and oil seeds.

Crop Diversification Program

The Green Revolution in India not only helped the nation to achieve food security but also changed food habits. In the process traditional crops have been replaced by commercial varieties. People in Punjab and Haryana, non-rice eaters started cultivating paddy for commercial markets. As previously discussed, the predominance of rice cultivation led to depleting ground water table and excessive use of chemicals in form of fertilizers and pesticides, thus affecting soil fertility. Therefore, to check the growing trend of paddy cultivation with alternative crops such as maize, cotton, poplar; The Ministry of Agriculture in 2013-14 launched Crop Diversification Program (CDP) in the original green revolution states of Haryana, Punjab and Western Uttar Pradesh. Launched as a sub-scheme of RKVY (Rashtriya Krishi Vikas Yojana) the program targets 'sustainable agriculture and increased productivity and profitability' (Government of India 2013-14). During the first year The Ministry of Finance, Government of India allotted Rs. 500 crore to replace the 'water guzzling' paddy during 2013-14 Kharif. The main objectives of CDP as listed in the plan document are as follows:

1. To demonstrate and promote the improved production technologies of alternate crops for diversion of water guzzling crop i.e. paddy' to alternate crops such as maize, pulses, oilseeds, poplar based agro-forestry system.

2. To restore the soil fertility through cultivation of leguminous crops that generates heavy biomass, and consumes lesser nutrient intake crops (Government of India 2013-14).

The aim of the program was to replace 5 per cent of area cropped under paddy from each of the three states with alternate crops. Along with maize the program aimed at re-introducing other alternative crops such as pulses, poplar, and oilseeds. An amount of Rs. 500 crore was been earmarked for these states. Further fund allotment to theses states is based on the last five year average of area under paddy cultivation and accordingly the fund is allocated. During 2013-14, the state of Haryana launched Crop Diversification Program to replace paddy with maize and other alternative crops from a total area of 2,80,000 hectares. Ten out of 21 districts in Haryana have been earmarked under CDP. These are Ambala, Yamuna Nagar, Karnal, Jind, Kaithal, Fathehabad, Panipat, Sirsa, Kurukshetra and Sonepat.

Components of Crop Diversification Programme

There are four major components to the program:

i. **Alternate Crops Demonstrations:** to promote alternate crops such as maize, pulses, agro forestry, inter cropping and oilseeds, 60 percent of the fund allotted to the respective states is been earmarked to be used in cluster demonstration of alternate crops. Assistance in form of free-of-cost seeds and fertilizers for maize, cotton, pulses, sunflower, poplar, eucalyptus, and inert cropping is extended to the farmers.

ii. **Farm Mechanization and Value Addition:** to encourage farmers to grow alternative crops 23 percent of the allocated fund is earmarked to be spent on providing subsidized farm implements to the farmers. A subsidy ranging from 40-50 per cent has been extended on tractor operated heavy implements such as maize planter, zero till seed drill, Laser land leveler etc. An additional 10 per cent subsidy is extended to SC/ST/small & marginal farmers.

iii. **Site Specific Activities:** 50 per cent of the installation cost and not more than Rs. 60,000 is provide to farmers under UGPL (underground pipelines). As a step towards organic farming and marinating soil health, the program allows a provision to distribute free-of-cost dhaincha seeds to the farmers. 15 per cent of the allotted funds are to be directed in promoting Site specific activities.

iv. **Contingency for awareness training, implementation & monitoring:** in order to spread awareness on farming methods and new techniques 2 per cent of the fund is earmarked to be utilized in organizing State and District level Kisan mela and Block level Kisan Gosthi in the state. About Rs. 1.5 lakh is earmarked to be spent for hiring vehicles and miscellaneous expense for Monitoring & Evaluation in each district.

The CDP is in continuation since 2013-14. In 2014-15, CDP again planned to divert 60,000 hectares (5 per cent of area under paddy) of paddy fields in Haryana. The plan also aimed to extend assistance to farmers to develop mechanized farming, develop land for agro-based food processing units to enhance income and also sustain soil fertility at the same time (Ministry of Agriculture 2013-14). In order to motivate the farmers to grow maize, the Government of Haryana announced to allocate hybrid maize seeds worth Rs. 2000-8000 rupees to individual farmers in the state for the period 2016-17. The free of cost seeds have been distributed through online direct benefit transfer (DBT) among farmers on the basis of individual land holdings. The program aims to reward the progressive farmers with incentives, carry forward awareness and training camps, and pay cluster demonstration units growing the alternative crops in each district.

Crop Diversification Program –Action Plan 2016-17

Under the aegis of Fasal Vividhikaran Yojana (Crop Diversification in Original Green Revolution States), an action plan 2016-17 had been laid down. The plan document

enlists the physical and financial targets for the year (Annexure-I[1]). The key features of the policy document are discussed below.

In 2014-15 the Government of Haryana launched schemes targeted directly or indirectly towards crop diversification for the first time. The Plan of Action 2016-17 targets to replace paddy from 39,240 hectares of agricultural land with alternative crops such as maize, cotton, agro-forestry and inter-cropping of agro forestry and wheat by the end of 2017. Maize, considered apt replacement to paddy is being promoted at a large scale. In this direction the government targets to distribute maize seeds worth Rs. 1250 lakh[2] - free of cost to the farmers. To promote agro-forestry the state government supplies fertilizers and pesticides to those farmers engaged in poplar plantation. Wheat-intercropping with poplar is also being promoted under crop diversification programe in the state.

Further to promote crop diversification in the state, cotton and agro-forestry based seeds are being distributed at subsidized prices and financial assistance is extended to farmers to procure mechanized farming equipments. It has approved to pay up to 40-50 per cent of the total cost in procuring 3370 tractor operated mechanized tools worth Rs.1583.50 lakh in the year 2016-17. In total; 250 maize PLANTERS, 910 zero till seed cum fertilizer drills, 1810 happy seeders and 400 maize/multi crop threshers have been covered under the scheme. The scheme also extends 50 per cent assistance for the construction of under ground pipe line (UGPL).

A target of 784 UGPL worth Rs.1097.60 lacs subsidy has been earmarked for the session. Rupees 599.90 lakh shall be spent on improving soil fertility through subsidized dhaincha for 59,990 hectares of agricultural land. In order to encourage farmers, Rs. 113 lakh shall be used on organizing Kisan Mela and Rs.15 lakh are earmarked for monitoring & evaluation. In total, Rs. 5656 lakh have been spared under crop diversification progrqammes for 2016-17.

[1] Component & Activity wise physical targets & financial allocation under Crop Diversification in Original Green revolution States 2016-17 (Government of Haryana)
[2] In INR

Table – 3.1: Targets and Achievements of CDP

Sl. No.	Name of Component	Physical Targets Achieved (in %)			Financial Targets Achieved (in %)		
		2013-14	2015-16	2016-17	2013-14	2015-16	2016-17
1	Cluster Demonstration Of Alternate Crops	59.77	68.41	8.99	36.71	61.57	7.22
2	Farm Mechanization	34.48	18.24	60.53	17.29	31.25	29.28
3	Site Specific Activities	76.55	77	114.4	81.12	68.98	22.07
4	Contingency & Awareness	99.86	60	92.85	52.28	70.53	96.84

It may be noted from the table above that during 2013-14 the performance of CDP in each respective component had modest start. In 2015-16 the significant increase in of achievement of both financial and physical targets were recorded. However, the percentage of achieving physical and financial targets remained lackluster owing largely to the introduction of online system of registration and benefit transfer to the farmers in 2016-17. Based on the inputs received from the field study, a detailed analysis is given on the performance of CDP and 2016-17 in chapters IV and V.

Chapter IV

Field View of Diversification of Agricultural Crops in Haryana

Following the scheme of the study as envisaged in the introduction, the present study undertook intensive field work to evaluate the achievements of diversification of agricultural crops under various schemes and programmes mainly CDP in Haryana. In addition, secondary information on the prevalent conditions and trends in agriculture in the state has been compiled using government gazettes, policy documents, annual reports and statistical abstracts of Haryana etc. The official stakeholders in the state agriculture department have also been consulted prior to the commencement of the fieldwork. Scientific literature and relevant studies have been consulted to design the basic framework of the study. The crux of the study however sits on the wealth of first hand data generated through questionnaires and schedules during an intensive fieldwork in the six sampled districts of Haryana.

Under the CDP, 10 districts from agro-climatic Zones I and II have been included in the crop diversification plan because these districts fall in the original green revolution areas. Districts from Zone I are Panipat, Kurukshetra, Karnal, Kaithal, Ambala, Yamunanagar and Sonipat. Out of 7 districts in Zone-II, Sirsa, Jind and Fathehabad have been included in the plan. The districts falling under agro-climatic Zone-III have not been covered under the plan.

A sample comprising 6 districts (4 from Zone-I and 2 from Zone-II) has been selected by applying purposive sampling method. The Fieldwork for the study was conducted in these selected districts. A sample of 180 farmers from 10 villages of 6 districts (4 from Zone-I and 2 from Zone-II) along with a number other stake holders as stated in the introduction chapter have been selected by applying purposive sampling method for primary data collection.

The ten districts clubbed under crop diversification plan are highly irrigated and mechanized to favour paddy cultivation. In order to establish a representative sample, the districts have been listed in an ascending order of their moving averages. In Zone-I, Panipat has witnessed a decrease in intensity of wheat and rice cultivation for a period 2008-2011. Sonipat recorded highest surge towards rice and wheat specialization in the given time. Employing an alternate mode of sample selection, Kurukshetra, Kaithal and

Yamunanagar are chosen out of the seven districts in Zone-I. The averages of the three districts are precise geographical representatives of the other districts in the Zone.

Table- 4.1: Trend of total area cropped under Paddy-Wheat cultivation in Haryana

Sl. No.	District	Agro Climatic Zone	Average of area under paddy and wheat in 2008-2011	Average of area under paddy and wheat in 2013-2016	Change in Area under Rice and Wheat cultivation	Intra-zonal crop intensity ranking
1	Ambala	I	79.7	82.8	3.1	IV
2	Panchkula	I	55.9	61.1	5.2	II
3	Yamunanagar	I	70.6	74.4	3.8	III
4	Kurukshetra	I	83.7	84.4	0.7	VII
5	Kaithal	I	85.8	87.5	1.7	V
6	Karnal	I	87.0	88.2	1.2	VI
7	Panipat	I	85.7	85.2	-0.5	VIII
8	Sonipat	I	76.2	82.6	6.5	I
9	Rohtak	II	59.1	63.4	4.3	I
10	Faridabad+Palwal	II	63.4	67.1	3.7	II
11	Jind	II	67.8	71.1	3.3	IV
12	Hisar	II	42.7	42.2	-0.5	VI
13	Fatehabad	II	62.7	66.2	3.5	III
14	Sirsa	II	47.4	50.3	2.9	V
15	Jhajjar	III	52.5	56.6	4.1	I
16	Gurugram	III	46.6	48.9	2.3	III
17	Nuh/Mewat	III	46.4	47.1	0.8	IV
18	Rewari	III	25.6	25.6	0.0	V
19	Mahendragarh	III	16.4	16.1	-0.3	VI
20	Bhiwani	III	23.3	26.7	3.4	II

Source: Statistical Abstract of Haryana, for computational details see annexure - 2.
Note: Faridabad and Palwal are clubbed together because no separate data is available prior to formation of Palwal as a separate district in 2009.)

From the above table, it can be drawn that 16 out of 20 districts in Haryana reflect a considerable surge in rice and wheat cultivation over a period of 8 years (2008-09 to 2015-16). It may be assumed that the figures hint at an overall trend toward mono-cropping dominance of paddy and wheat in the state. The districts are arranged in an ascending order of rice and wheat specialization for the given period. In Zone-I, the

average for Panipat (-0.5 per cent) point at fall in rice and wheat cultivation, while the average in Sonipat (6.5 per cent) represents the rising trend of mono-cropping and further compliments the entire sample size and expands the mathematical range, thus guided in understanding the socio-cultural and socio-economic patterns promoting such variations. In Zone-III Sirsa, Jind and Fathehabad districts were shortlisted to cover wide geo-political and socio-economic factors impacting the diversification of agricultural crops with averages of 2.9, 3.3 and 3.5 per cent respectively.

However, figures from Panipat, Hisar, Mahendergarh and Rewari indicate declining trend in paddy and wheat cultivation and increasing trend of production of other crops. Interestingly, districts like Panchkula, Sonipat and Jhajjhar which are closure to Chandigarh, Gurugram and Delhi, a potentially high demand area for horticultural products, exhibit higher paddy and wheat specialization when compared to other districts in the state.

In the last five years (2011-12 to 2015-16), the total cropped area under wheat has increased by 1.76 per cent and the total production of wheat dropped by 13.46 per cent in Haryana. The area cultivated under rice increased 9.71 per cent, while the production grew 10.32 per cent. Use of high yield crop varieties, improved irrigation networks[1], low risks and assured returns, high MSP, and favourable market system has resulted in the remarkable augmentation of wheat and rice as major crops of the state. On the other hand, production of maize witnessed a dip by 43.33 per cent, barley by 33.55 per cent, bajra by 44.51 per cent and pulses 62.52 per cent during the last five years. Owing to high risk factors involved in growing pulses, the total area cropped under pulses fell by 49.75 per cent (for details refer Table nos. – 2.1, 2.2 and 2.3).

Out of the total 180 farmers, 36 farmers were Marginal, 43 were small, 53 were semi-medium, 36 were Medium, whereas 09 farmers belonged to large land holding category. Almost every farmer irrigates his land with tube well, however 17 percent farmers have access to canal water as well. It was found that 98 percent cultivated lands were properly irrigated except for a few land holdings in Fatehabad (3), Sirsa (2) and Sonipat (1) districts which were not adequately irrigated. The farmers who were interviewed represented to wide spread categories of based on land holdings sizes, such as, Marginal (2.5 acre or less), Small (2.5 to 5.0 acres), Semi-medium (5 to 10 acres), Medium (10 to 25 acres) and a few with Large land holdings (above 25 acres).

[1] 88.9 per cent of gross cropped area if irrigated through canals (43.4 per cent) and tube wells (56.6 per cent). (http://agriharyana.nic.in/Stat_Info/Vital%20Of%20Statistics%202014-15.pdf)

Awareness of the schemes

Out of our total sample of 180 farmers from six districts in Haryana, less than 50 per cent farmers (49.4) are found aware about the ongoing diversification schemes. Variation has been observed across selected districts in terms of awareness about the CDP as around 50 per cent farmers were aware about the programmes/schemes in Yamunanagar district, 40 percent in Kurukshetra, 53 percent in Fatehabad, and 43 percent Kaithal and Sirsa each and 66.7 per cent in Sonipat (Table 4.2).

Table 4.2: Awareness of the crop diversification schemes (based on size of Land Holding in %)

Name of the District	Marginal	Small	Semi-Medium	Medium	Large	Total
YN	6.7	6.7	20.0	16.7	0.0	50.0
KKR	6.7	10.0	16.7	6.7	0.0	40.0
FTH	0.0	3.3	10.0	30.0	10.0	53.3
KTH	13.3	10.0	20.0	0.0	0.0	43.3
SRS	0.0	6.7	3.3	20.0	13.3	43.3
SOP	6.7	23.3	20.0	13.3	3.3	66.7

Table 4.3: Beneficiaries of Crop Diversification Programmes (% of aware farmers)

Name of the Districts	Marginal	Small	Semi-Medium	Medium	Large
YN	0.0	50.0	66.7	40.0	0.0
KKR	0.0	66.7	80.0	100.0	0.0
FTH	0.0	100.0	66.7	77.8	66.7
KTH	75.0	66.7	100.0	0.0	0.0
SRS	0.0	100	100	83.33	100
SOP	100	71.4	100	75	100

In Yamunanagar, 7 per cent of farmers with marginal landholdings were aware of the CDP but none of them was found to have availed any benefits (see Tables 4.2 and 4.3). Similarly, 7% of farmers with small landholding were aware of CDP and 50 per cent of those who were aware but could avail the benefits. On the other hand 20% of the semi-medium farmers were found aware and 68% of them have availed the benefits. 16% of medium landholders were found aware and 40% of these had availed the benefits (see Tables 4.2 and 4.3).

In Kurukshetra, 7% of the marginal landholders have been found aware but none has availed the benefits. 10% of the small landholders were aware and 67% out of these have availed the benefits. 17% of semi-medium landholders were aware and 80% have availed the benefits. Out of 7% medium landholder aware of the schemes, 100% of these have availed the benefits (see Tables 4.2 and 4.3).

In Fathehabad, none of the marginal landholder was found aware as a result none of the marginal farmer availed any benefits. 3% of the small landholders were aware and all of them had availed some benefits from the schemes (see Tables 4.2 and 4.3). 10% of the semi-medium landholders have been aware and 67% have availed the benefits. 30% of the medium landholders were aware and 78% of them availed benefits (see Tables 4.2 and 4.3). 10% of the large farmers were also aware and 67% of these category availed benefits.

In Kaithal, 13% of the marginal landholders were aware and 75% of them availed the benefits. 10% of the small landholders were aware and 67% availed benefits. 20% of the semi-medium landholders were aware and all of them availed the benefits (see Tables 4.2 and 4.3).

In Sirsa, none of the marginal landholders were aware about the CDS benefits. 7% of small landholders have been found aware and 100% of them availed the benefits. 3.3% of semi-medium landholders were aware and all of them had availed the benefits (see Tables 4.2 and 4.3). 20% of the medium landholders were aware and 83% of them had availed benefits. 13% of large landholders were aware and 100% of them availed benefits.

In Sonipat, 7% of marginal were aware and all of them availed the benefits. 23% of small landholders were aware and 71% have availed the benefits. 20% of semi-medium landholders were aware and 100% availed the benefits (see Tables 4.2 and 4.3). 13% of medium landholders were aware and 75% availed the benefits. 3% of the large were aware and all of them had availed the benefits.

It is worth a mention that in all the 6 districts, the Department of Agriculture has remained on top in terms of information dissemination on various CDP. Out of total farmers aware about the CDP schemes, around 80% of them have come to know through Agriculture Department, more than 90% in Fathehabad and Sonipat have received information through Agriculture Department (Table 4.4). In case of Kurukshetra, Kaithal and Sirsa, 100% of farmers came to know through Agriculture Department. Additionally

it is found that farmers have received information about CDP through advertisements flashed on print, digital media and friends and relatives.

Table 4.4: Sources of Information (%age distribution)

Districts	Newspapers/ Television/ Radio	Message	Agriculture Department	Villagers	Relatives and Friends	Total
YN	6.7	0.0	80.0	6.7	6.7	100.0
KKR	0.0	0.0	100.0	0.0	0.0	100.0
FTH	6.3	0.0	93.8	0.0	0.0	100.0
KTH	0.0	0.0	100.0	0.0	0.0	100.0
SRS	0.0	0.0	100.0	0.0	0.0	100.0
SOP	10.0	0.0	90.0	0.0	0.0	100.0

It was evident that a large section of the farmers were not aware about the names of the majority of the schemes. This unawareness about the nature and scope of any particular scheme or programme sometimes leads to confusion among the farmers. Therefore, there is a need for more awareness dissemination to the farmers so that they know the nature of benefits to expect from a particular programme.

Measures to improve Soil Health

Improving the soil health is one of the major objective of promoting crop diversification. It was observed that majority of the farmers claimed to take some or the other measures to improve soil fertility.

i. **Abstinence from stubble burning**

The practice of paddy stubble burning is a threat to soil health. Abstaining from stubble burning is a great success on the part of farmers. Therefore, we have recorded the responses from the farmers on stubble burning as an indicator of soil health in respective districts. 97% of the farmers in Kaithal and 90% of the farmers in Kurukshetra claimed to have abstained from practicing stubble burning. The official reports corroborate with the findings. The district agriculture department has employed strict measures against the farmers those involved in stubble burning. A cash penalty and First Information Report (FIR) with the Police against the defaulters have been imposed in Kurukshetra. The numbers are fairly good in Fathehabad (67%), Sirsa (77%) but not so encouraging in

Sonipat (57%) and Yamunanagar (17%) (Table - 4.5). Strict action by concerned authorities is recommended and is sure to bring positive results as exemplified in Kaithal and Kurukshetra.

Table 4.5: Measure to Improve Soil Health (%age of total Sample)

Districts	No stubble burning	Organic fertilizer	DSR	Land levelling	UGPL	Drill	Gypsum
YN	16.7	86.7	26.7	33.3	13.3	6.7	13.3
KKR	90.0	93.3	20.0	80.0	23.3	6.7	6.7
FTH	66.7	100.0	26.7	86.7	60.0	10.0	13.3
KTH	96.7	100.0	0.0	100.0	23.3	0.0	16.7
SRS	76.7	90.0	20.0	100.0	73.3	36.7	50.0
SOP	56.7	96.7	16.7	90.0	73.3	23.3	63.3

ii. **Other initiatives**

As discussed in previous chapters, use of chemical based pesticides and fertilizers has negative impacts on soil fertility and health. Replacing the harmful inputs with organic fertilizers, growing *Dhaincha* and improvising vermicomposts contribute to improving the overall soil health. A majority of the farmers in all the districts during the study have confirmed of using organic alternatives in farming to improve soil quality. 20-26% farmers in Yamunanagar, Kurukshetra, Fathehabad, and Sirsa have adopted DSR (Direct Seeding Rice) technique in paddy cultivation. As compared to the traditional method, the technique helps in reducing the input cost and cut water requirement to a significant level. In all the districts farmers have been contributing to save the input cost by taking measures such as land levelling, UGPL, drill system and use of gypsum to save water wastage and improve the yield quality (Table, 4.5).

Sources of Agricultural Loan

It is well argued that farmer debt works against diversification because debt ridden farmers do not experiment new crops. Hence we have collected information on debt of farmers from various sources. It is interesting to know that on average around 85 percent farmers have taken loan from various sources. But there is a huge variation across selected districts (Table 4.6).

In Yamunanagar, 83% of the farmers have taken agricultural loans from various sources. 56% of these farmers received loans through KCC (Kisan Credit card) scheme, 19% have approached government banks and co-operatives for the agricultural loan. 13% of the farmers preferred taking loans from the local moneylenders (Table 4.6). While remaining 13% of the farmers have either taken loan from private banks or borrowed the money from relatives and friends.

The landless farmers in Yamunanagar, have opted to take loans from unorganized sectors at higher interest rates (Table 3.5). 60% of the landless farmers opted local moneylenders while 40% of the landless farmers approached family members and relatives for the agricultural loans. According to the sample, average agricultural loan against a single landless farmer is about Rs. 2,50,000 (Table 4.6).

Further, it was analysed the farmers' loan according to their land holdings. 7% of the marginal farmers have taken loans from local moneylenders, 65% opted for KCC, while 28% have taken loans from private banks. In case of small farmers, 63% have taken loan through KCC, 6% went to the local moneylenders and 29% have taken loan from government co-operative banks (See annexure - 3).

In case of semi-medium farmers, 45% have availed loan through KCC, 13% from local moneylenders and 27% from government co-operative banks. 10% farmers took loan from family and relative and 4% from the societies. 82% of medium landholders have taken loan under KCC, 14% from local moneylender and 4% from regional societies (See annexure 3).

Large landholders have not taken any loans from any of the available sources. Consequently, it can be inferred that the level of awareness and farm sizes allows the farmer with better decision making further enhancing the scope for profitable returns.

In Kurukshetra, 72% of the farmers have taken agricultural under KCC. 52% of the marginalized farmers covered under the study have taken loans under KCC, 90% of small landholders, 58% of semi-medium landholders, 100% of medium landholders have taken loan under KCC (Annexure - 4). 20% of the marginal farmers, 3% small landholders and 31% semi-medium landholders under the study took loans from private moneylenders.

Table 4.6: Source of Loan and Distribution (in %)

Districts	No of Farmers	Govt. Banks/ Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/ Aarthiya	Relatives and Friends	Society	Total
YN	83.3	18.6	4.3	55.7	12.6	6.2	2.5	100.0
KK	90.0	2.6	0.0	72.1	17.6	1.4	6.4	100.0
FTH	90.0	2.7	1.1	78.4	13.1	0.0	4.7	100.0
KTH	73.3	2.0	0.0	67.8	29.9	0.3	0.0	100.0
SRS	93.3	0.0	0.0	77.1	20.8	0.0	2.2	100.0
SOP	76.7	0.0	0.0	95.1	3.8	0.0	1.1	100.0
Total (in %)	84.4	3.4	0.8	75.6	16.5	0.9	2.8	100.0

In Fathehabad, 78% of the farmers have taken loan though KCC. Out of total sampled farmers, 13% of the farmers have taken loan from private moneylender. Further, 5% of the farmers have taken loans from local societies and 3% of the farmers have taken loans from government bank and co-operatives (Table 4.6).

Category-wise distribution of farmers have provided interesting results as 55% of the marginal farmers, 78 small landholders, 58% semi-medium landholders, 85% of the medium landholders and 100% of the big land holders have taken loan under KCC (Annexure – 5).

Further, 29% of the marginal landholders, 20% of the small landholders, 26% of semi-medium, 9% of medium landholders have taken loans from local moneylender. 15% of the marginal, 3% of the small, 5% each of semi-medium and medium landholders have taken loan from societies. Further, 11% of the semi-medium landholders have taken the loan from co-operative banks.

In Kaithal, out of total surveyed farmers, 68% of the farmers have taken loan under KCC, 30% have opted the moneylenders and 2% went to government banks and co-operative banks for agricultural loans (Table 4.6).

Disaggregated analysis suggests that 29% of the marginal farmers, 66% of the small, 77% of the semi-medium and 57% of the medium farmers have availed loan through KCC. 71% of the marginal, 14% of the small, 23% of the semi-medium and 43% of the medium landholders have opted local moneylenders. 17% of the small landholders have taken loan from government institutions (Annexure – 6).

In Sirsa, 77% of the farmers under the study have taken loan using KCC, 20% took the loan from local moneylender and 2% from the societies (Table 4.6). 12% of the

marginal landholders, 63% of the small, 74% of the semi-medium, 89% of the medium and 66% of the large landholders have taken loan from KCC. 88% of the marginal, 35% of the small, 22% of the semi-medium, 11% of the medium and 26% of the big landholders have taken loans from local moneylenders (annexure – 7). 3% of the small, 4% of semi-medium and 9% of the big landholders have taken loan from societies.

In Sonipat 95% of the farmers covered under the study have taken loan using KCC, 4% have taken loans from moneylender and 1% from societies (Table 4.6). Based on the land holding, it was observed that 60% of the marginal landholders, 100% of the small farmers, 96% of the semi-medium farmers, 100% of the medium and 98% of the large landholders have taken loans using KCC. 40% of the marginal farmers have taken loans from local moneylenders. 4% of the semi-medium landholders and 2% of the big landholders have taken loan from societies (Annexure – 8).

Table 4.7: Assistance to grow alternative crops (in %)

Districts	Maize	Cotton	Agro forestry/ Poplar	Inter cropping with agro forestry
YN	0.0	0.0	16.7	16.7
KK	10.0	0.0	13.3	26.7
FTH	6.7	3.3	0.0	0.0
KTH	0.0	10.0	0.0	0.0
SRS	0.0	0.0	0.0	0.0
SOP	0.0	36.7	0.0	0.0

The government of Haryana has announced various schemes to encourage crop diversification. It is observed that out of all the farmers interviewed, none of them availed the benefits under crop diversification program to grow maize in Yamunanagar, Kaithal, Sirsa and Sonepat. 10% of the selected farmers in Kurukshetra and around 7% in Fathehabad have availed the benefit.

In case of cotton production, 37% of the farmers have availed benefits to grow cotton under CDP in Sonepat whereas only 3% farmers in Fathehabad and 10% farmers in Kaithal have availed the benefit of under CDP to grow scheme.

In case of poplar cultivation, around 17% of the selected farmers in Yamunanagar and around 13% in Kurukshetra have availed the benefits to grow poplar under CDP. No farmers in Kaithal, Sirsa, Fathehabad and Sonepat availed the benefits to grow poplar.

Assistance for inter-cropping was also provided under CDP. 17% in Yamunanagar and 27% farmers in Kurukshetra have availed benefits under agro-forestry scheme and no farmers from other districts has availed any benefits.

It may be noted that total cropped area under maize increased by 700 per cent in Kurukshetra between 2013-14 & 2015-16. On the other hand no progress has been recorded in the overall production in maize for the same duration. From the primary data gathered from the sampled districts, following reasons for failure of maize crop has been observed: inadequate procurement process, lesser per acre revenue generation in comparison to rice, high MSP and lack of storage facility for storing harvest till market rate increases etc. Some of the farmers admitted using the subsidised seeds as dairy fodder.

Interestingly, Kurukshetra has been the only district to have recorded a positive trend in maize. The introduction of online registration portal has been found to create a technological hurdle, barring a majority of farmers from availing the benefits of the schemes. Some farmers claimed they were uninformed and technologically unequipped to register themselves.

Table 4.8: Did you avail subsidy for any of the following equipment for the year 2016-17:

Districts	Maize Planter	Zero Till Seed cum Fertilizer Drill	Maize/Multi crop Thresher
YN	3.3	0.0	0.0
KK	0.0	0.0	0.0
FTH	6.7	3.3	0.0
KTH	3.3	0.0	3.3
SRS	16.7	0.0	0.0
SOP	0.0	0.0	0.0

To ensure mechanization, the government of Haryana has announced various benefits under CDP. These include subsidies on maize planter**,** zero till seed cum fertilizer drill**,** and maize/multi crop thresher (Table 4.8)**.** It is observed that 17% of the farmers in Sirsa, 7% in Fathehabad, 3% each in Yamunanagar and Kaithal have availed subsidy for maize planter (Table 4.8).

During the study it was found that zero till seed cum fertilizer drill was not purchased by any of the farmers in 6 districts except in Fathehabad where 3% of the farmers availed the subsidy (Table 4.8). Also, maize/multi crop thresher has been procured by 3% of farmers in Kaithal.

Table 4.9: Assistance in Site Specific Activities

Districts		UGPL			Dhaincha Seeds	
		Self	Govt	NO	Yes	No
YN	No of farmers	8.0	1.0	21.0	5.0	25.0
	%age share	26.7	3.3	70.0	16.7	83.3
KK	No of farmers	14.0	2.0	14.0	6.0	24.0
	%age share	46.7	6.7	46.7	20.0	80.0
FTH	No of farmers	19.0	5.0	6.0	12.0	18.0
	%age share	63.3	16.7	20.0	40.0	60.0
KTH	No of farmers	8.0	4.0	18.0	9.0	21.0
	%age share	26.7	13.3	60.0	30.0	70.0
SRS	No of farmers	20.0	5.0	5.0	10.0	20.0
	%age share	66.7	16.7	16.7	33.3	66.7
SOP	No of farmers	16.0	7.0	7.0	15.0	15.0
	%age share	53.3	23.3	23.3	50.0	50.0

Table 4.9 analyses the assistance provided for site specific activities (UGPL and Dhaincha Seeds). The CDP provided a subsidy on the purchase of material to implement Under Ground Pipe Lines and distributed Dhaincha seeds free of cost to the farmers.It was found that 57 respondents had availed Dhaincha seeds under the site specific activities, however there was a greater demand for increasing the distribution of per capita quantity of dhaincha seeds. It was recorded that the respondents were proactive towards growing dhaincha and using organic farming methods including vermicompost. From the above table no. 4.9, it could be noted that 109 (61% of 180) respondents installed underground pipe lines. Out of these (109 respondents), 78% of the farmers have opted not to avail the government benefits. The farmers reported that quality issues and inflated cost of the pipes approved under CDP were major reasons for not availing the subsidy under the site specific development activities. Out of those farmers who installed UGPL, nearly 89% of the farmers in Yamunanagar, 88% in Kurukshetra, 79% in Fathehabad, 67% in Kaithal, 80% in Sirsa and 70% in Sonepat opted not to avail the scheme rather bought pipes from the market (Table 4.9).

The farmers reported that the pipes under subsidy have been quoted at a significantly high cost, making the rationale of subsidy not beneficial. One of the respondents said during the interaction that there was no point in buying an overpriced pipe, knowing the fact that the quality and durability of the authorized and unauthorized pipes were almost same. In Yamunanagar, out of 30% farmers (out of 30 respondents) who have installed underground pipe lines, only 3% have availed benefits under the CDP

(Table 4.9). In Kurukshetra, out of 54% farmers who have installed underground pipes, 7% opted to avail benefits under CDP. Similarly, in Fatehabad out of 80% farmers who installed underground pipe lines 17% have availed benefits of government subsidies (Table 4.9). Whereas the percentage of beneficiaries of UGPL subsidies in Kaitha, Sirsa and Sonepat were 13%, 17% and 23% respectively.

Table 4.10 offers information on the percent of farmers who have participated in Kisan Mela/exhibition organized by government department at different level. It is observed that Yamunanagarh has remained on top as 73 per cent farmers have participated in kisan mela during last one year whereas Kurukshetra was at the bottom as only 50 percent of the sampled farmers have participated in Kisan mela (Table: 2.10).

Table 4.10: Farmer Participation in any Kisan Mela / exhibition

Districts		**Yes**	**No**
YN	No of farmers	22.0	8.0
	%age share	73.3	26.7
KK	No of farmers	15.0	5.0
	%age share	50.0	16.7
FTH	No of farmers	23.0	7.0
	%age share	76.7	23.3
KTH	No of farmers	18.0	12.0
	%age share	60.0	40.0
SRS	No of farmers	21.0	9.0
	%age share	70.0	30.0
SOP	No of farmers	13.0	17.0
	%age share	43.3	56.7

Table 4.11: Farmer Participation in any Kisan Mela / exhibition at different levels

Districts		**State level**	**District level**	**Block level Kisan Sanghoshti**
YN	No of farmers	10.0	20.0	4.0
	%age share	33.3	66.7	13.3
KK	No of farmers	8.0	14.0	6.0
	%age share	26.7	46.7	20.0
FTH	No of farmers	13.0	22.0	14.0
	%age share	43.3	73.3	46.7
KTH	No of farmers	12.0	16.0	7.0
	%age share	40.0	53.3	23.3
SRS	No of farmers	16.0	20.0	12.0
	%age share	53.3	66.7	40.0
SOP	No of farmers	7.0	12.0	9.0
	%age share	23.3	40.0	30.0

Kisan mela at district, block and state levels are organized under Contingency and Awareness to disseminate information to the farmers. During the study it has been found that 68% of the farmers have participated in Kisan mela held at various levels (Table 4.11). The district wise participation off farmers has been as follows: 73% in Yamunanagar, 50% in Kurukshetra, 77% in Kaithal, 70% in Sirsa and 43% in Sonepat.

As per OECD report 2017, 'Out of every 100 marginal farmers, more than 60 have contracted debt from money lenders and less than 13 from banks, with 85 per cent of their outstanding loans from non-institutional sources' (OECD Economic Surveys India - 2017: 44).

Analysis of achievements of CDP

Based on the information supplied by the offices of the Deputy Director (Agriculture) of the concerned districts, following is the detailed analysis of the achievements of the CDP-2015-16 & 2016-17 action plans so as to corroborate with the findings of the field study.

The target of Maize demonstration in Yamunanagar fell short because farmers anticipated poor market prices of the harvest. Farmers reported that poplar was a prevalent crop in the area but farmers have failed to avail the benefits from CDP 2016-17, due to various reasons. Firstly, lack of awareness and secondly with the starting of online system. However, intercropping of wheat with popler was largely done in the district, due to existing infrastructure and a satisfactory feedback among the farmers.

Table: 4.12: Progress Report of CDP in Yamunanagar (area in hectare)

	Target Area/no.	Achieved Area/no.	% Area	Target Financial	Achieved Financial	% Financial
Alternate Crop Demonstration						
Maize						
2016-17	5500	202.4	3.6	275	10.1	3.6
Poplar						
2016-17	900	0	0	90	0	0
Inter-cropping wheat						
2016-17	2440	1599	65.5	122	79.9	65.5
Farm Mechanization And Value Addition						
2016-17	515	123	23.8	168.9	22.91	13.5

Site Specific Activities						
Dhaincha						
2016-17	15000	0	0	40.5	0	0
Contingency For Awareness Training, Implementation, Monitoring Etc						
2016-17	22	22	100	12.2	12.1	99.9
Total						
	Budget estimated		Budget Utilized		%Budget utilized	
2016-17	708.6		125.1		17.6	

Area under wheat cultivation in Yanmunanagar, between 2013-14 and 2014-15, has increased by 4 % with a constant production throughout these years. The advocacy components of the CDP such as Kisan mela and organizing exhibitions have been utilized in the districts, however, some farmers suggested that more melas should be organised at the local levels. Tangible items such as heavy equipments have also been utilized in full capacity. Zero Seed cum fertilizer driller has been the most sought after farm equipment. There was no taker for Dhaincha under the program. It was reported that due to online applications system the participation of farmers decreased to a great extent. Nevertheless, it is expected that by in successive years the participation of the farmers may increase and also it would result in a transparency at micro scale.

Table - 4.13: Progress Report of CDP in Kurukshetra (area in hectare)

	Target Area/no.	**Achieved Area/no.**	**% Area/no.**	**Target Financial**	**Achieved Financial**	**% Financial**
Alternate Crop Demonstration						
Maize						
2015-16	1200	1204.4	100.36	5834024	5834024	100
2016-17	1976.8	74.1	4	370500	370,500	100
%Change	65	-93		-94	-94	
Sunflower						
2015-16	2604	2467.5	95	9763500	9253275	95
2016-17	0	0	0	0	0	0
%Change						
Poplar						
2015-16	73.6	57.2	78	736000	572000	78
2016-17	43	42.6	99	430000	426000	99
%Change	-42	-26		-42	-26	
Inter-cropping Gram						
2015-16	40	40	100	200000	182022	91.011

2016-17	0	0	0	0	0	0
%Change	-100	-100		-100	-100	
Mustard						
2015-16	80	0	0	400000	0	0
2016-17	0	0	0	0	0	0
%Change	-100	0	0	0	0	0
Wheat						
2015-16	800	800	100	4000000	4000000	100
2016-17	200	68.6	34.3	343000	343000	100
%Change	-75	-91		-91	-91	
Farm Mechanization and Value Addition						
2015-16	1388	228	16	27814000	4823000	17
2016-17	655	243	37	7917500	6140000	78
%Change	-53	7		-71	27	
Site Specific Activities						
UGPL						
2015-16	7916	7916	100	31256000	28400000	91
2016-17	0	0	0	0	0	0
%Change	-100	-100		-100	-100	
Contingency for Awareness Training, Implementation, Monitoring Etc						
2015-16	7	7	100	440000	289937	66
2016-17	18	18	100	975000	973840	100
%Change	157	151		122	236	
Total						
	Budget estimated		Budget utilized		% Budget Utilized	
2015-16	80443524		53354258		66.32	
2016-17	10036000		8253340		82.23	

Table - 4.14 Number of Beneficiaries under CDP in Kurukshetra

Maize demonstration		**Wheat intercropping**	**Gram intercropping**	**Farm mechanization**
2015-16	1197	778	88	228
2016-17	103	92	0	243

In 2015-16, 86 per cent of the targeted lands were cropped under maize demonstration in district Kurukshetra. However, in 2016-17 the raised to 65 per cent increment but only 4 per cent of the targets were achieved. The number of beneficiaries recorded a fall from 1197 in 2015-16 to mere 103 in 2016-17. The acreage under maize demonstration reduced by 93 percent; from 1024 hectares in 2015-16 to 74.1 hectares in 2016-17 (Table: 4.13). As far as farm mechanization concerned 78 % and 91% farmers received subsidy for Zero till seed cum fertilizer drill in 2015-16 and 2016-17 respectively. As per the information provided (Memo No. 4607-48/JD (AE) dated

24.07.2017) in the Action Plan document, in Kurukshetra Rs. 51,74,500 balance budget from CDP (RKVY) has been diverted to pay the bills against the purchase of implements under RKVY Schemes.

During CDP 2016-17, 22 Straw Reaper, 2 Reaper Binder, 1 Straw Shreder, Disc Harrrow and Straw Chopper each have been provided to SC/ST/Small & marginal farmers at 50% subsidy over the cost of purchase. 22 Straw Reaper, 6 Rotavator, 4 Mulcher. 2 Straw Chopper and 1 Land Leveler, Straw Bailer and Hey Rake each have been provide to other beneficiaries at a subsidy of 40% against the cost of purchase.

Over the gap of two years, the area cropped under maize reduced by 99.8% in Kaithal. On the other hand cotton faired cent per cent during the same time period. 100% of the targets for cotton during 2016-17 have been achieved. Similarly, area under Dhaincha has also expanded by 99.97%. It has been found that farmers vary of growing paddy but need a way-out. Low MSP, indefinite market trends and fluctuating rates are found to be the major factors discouraging farmers from making a shift towards maize cropping because a small landholder cannot afford to divert from a hassle-free sure crop and experiment a new crop. Large landholders having more than 10 acres of land have shown some interest in growing alternative crops.

Table - 4.15: Progress Report of CDP in Kaithal (area in hectare)

	Target Area/no.	**Achieved Area/no.**	**% Area/no.**	**Target Financial**	**Achieved Financial**	**% Financial**
Alternate Crop Demonstration						
Maize						
2015-16	1500	1496	99.73333	75	71.025	94.7
2016-17	5000	1.5	0.03	10	0	3
% Change	233.3	-99.8		-86.6	-99.5	
Cotton						
2015-16	0	0	@	0	0	
2016-17	1993	1993	100	14947500	@	
% Change	@	@		@	@	
Farm Mechanization and Value Addition						
2015-16	508	440	86.61	88.5	76.35	86.27
2016-17	231	344	148.91	66.2	79.1	119.48
% Change	-54.52	-21.81		-25.19	3.60	
Site Specific Activities						
Dhaincha Seeds						

2015-16	0	0	0	0	0	
2016-17	960	959.76	99.97	2447388	815000	33.30
% Change						
Contingency for Awareness Training, Implementation, Monitoring Etc						
2015-16	7	6	85.71	4.4	2.39	54.31
2016-17	21	21	100	10.2	10.15	99.50
% Change	200	250		131.81	324.68	
Total						
	Budget estimated		Budget utilized		%Budget utilized	
2015-16	1188		285.68		24.04	
2016-17	26034888		24690500		94.83	

The contingency plans featuring awareness drives and Kisan mela and sanghosti have fared up the charts. The targets and achievements have doubled within a time span of two years. With 100% success rate the contingency plans have efficiently met the financial targets for the given time period. In total, 95% of the planned budget has been used in CDP 2016-17, Cotton, Dhaincha and contingency plans have managed to achieve almost 100% of the targets.

Table - 4.16: Progress Report of CDP in Fatehabad (area in hectare)

Maize	**Target Area/no.**	**Achieved Area/no.**	**% Area/no.**	**Target Financial**	**Achieved Financial**	**% Financial**
2015-16	300	300	100	14.88	14.88	100
2016-17	1250	67.12	5.36	62.5	3	5.36
%Change	316.66	-77.62		320.02	-77.44	
2015-16	1452	680	46.83	278.59	126.07	45.25
2016-17	443	226	51.01	154.42	56.49	36.58
%Change	-69.49	-66.76		-44.57	-55.19	
Contingency for Awareness Training, Implementation, Monitoring Etc.						
2015-16	7	4	57.14	4.4	0.69	15.83
2016-17	21	21	100	10.2	9.29	91.07
%Change	200	425		131.81	1233.62	
		Budget estimated		Budget Utilized		
	2015-16	297.87		141.65		47.55
	2016-17	227.12		69.14		30.44

It may be noted from the table above that in Fatehabad, the target of maize demonstration was only 5.36 percent in 2016-17 however, physical target was raised to 316% in comparison to 2015-16. Despite a fall in targets for farm mechanization, the targets in 2016-17 (51%) have been efficiently fulfilled when compared to 2015-16 (46%). However the overall budget utilization has dropped by 17 % when compared to 2015-16. Contingency and awareness programs have shown progress, 100 % physical targets have been achieved, and 91 % of the financial targets are achieved.

During CDP 2016-17, in Fathehabad, the targets for Straw Reaper and Rotavator were not fixed. However, under farm mechanization Rs. 23.31 lakh have been utilized in 37 Straw Reaper and Rs. 25,000 on 1 Rotavator provided to the SC/ST/Small and Marginal farmers at 50% subsidy on the cost of purchase. In similar fashion an amount of 10, 00,000 is utilized in 20 Straw Reaper provided to the other beneficiaries at 40% subsidy on the purchase cost.

Table - 4.17: Progress Report of CDP in Sirsa (area in hectare)

	Target Area/ no	**Achieved Area/no.**	**% Area/no.**	**Target Financial**	**Achieved Financial**	**% Financial**
Alternate Crop Demonstration						
Maize						
2015-16	300	300	100	14.88	14.88	100
2016-17	1200	594	49.5	29.707	29.67	99.87
%Change	300	98		99.64	99.3	
Farm Mechanization And Value Addition						
2015-16	936	257	27.45	23930000	9590000	40.07
2016-17	174	240	137.93	0	5965000	@
%Change	-81.41	-6.61		0	-37.79	
Contingency for Awareness Training, Implementation, Monitoring Etc.						
2015-16	7	7	100	4.4	4.3	99.01
2016-17	21	21	100	10.2	9.64	94.56
%Change	200	200		-76.81	-77.86	
Total						
	Budget estimated		Budget Utilized		%Budget utilized	
2015-16	25862 000		11513666		44.51	

The performance of physical targets for maize demonstration in Sirsa has reduced to half in 2016-17 when compared to 2015-16, however almost 99 % of the financial targets have been utilized. Physical targets for farm mechanization have decreased when compared to previous year. In 2016-17, 270% more subsidies on farm implements were disbursed. 94% of the Contingency has been utilized in the given year 2016-17.

In Sirsa, under CDP 2016-17, targets were not fixed for the some components, yet Rs 18.84 lacs have been utilized in providing 157 Zero Till Seed cum fertilizer drill at 50% subsidy against the cost of purchase and 8 Happy Seeder worth Rs. 4.41 lakh at 50% subsidy at purchase cost to the SC/ST/Small & Marginal Farmers. Rs 4.5 lakh have been utilized against the subsidy of 7 Happy Seeder and 58 Straw Reaper worth Rs. 22.84 lakh to other beneficiaries at 40% subsidy against the purchase cost.

Table - 4.18: Progress Report of CDP in Sonipat (area in hectare)

	Target Area/No.	**Achieved Area/No.**	**% Area**	**Target Financial**	**Achieved Financial**	**% Financial**
Alternate Crop Demonstration						
Maize						
2015-16	1000	991.6	99.16	50	45.4	
2016-17	3000	53.4	1.78	15	2.67	17.8
%Change	200	-94.6		-70	-94.1	
Cotton						
2015-16						
2016-17	3500	3500	100	262.5	169.21	64.46
%Change						
Agroforestry (Popler)						
2015-16		4.8			0.48	
2016-17	14.4	14.4	100	1.44	1.44	100
%Change		200			200	
Farm Mechanisation and Value Addition						
2015-16	2172	504	23.0	278.59	146.4	52.7
2016-17	443	116	26.18	158.13	24.7	15.6
%Change	-79.60	-76.98		-43.08	-83.1	
Site Specific Activities						
Dhaincha						
2015-16	3996.4	3996.4	100	36.44	36.44	100
2016-17	5200.8	5200.8	100	39.78	39.78	100

%Change	30.1	30.1		9.1	9.1	
Contingency for Awareness Training, Implementation, Monitoring Etc.						
2015-16	7	7	100	4.4	4.38	99.5
2016-17	25	25	100	12.65	12.54	99.1
%Change	257.1	257.1		187.5	186.3	
Total						
	Budget estimated		Budget Utilized		%Budget utilized	
2015-16	368.6		233.2		63.2	
2016-17	489.5		250.3		51.1	

In Sonipat, the targets for maize demonstrations have increased 3 times however the area cropped under maize has declined significantly. During 2015-16 99% of the targets have been achieved, however in 2016-17 about 2% of the physical targets for maize demonstration has been achieved. Similarly, the 17% of the amount earmarked for maize demonstration has been utilized.

The farmers did not avail cotton during CDP 2015-16, however in CDP 2016-17 Rs. 262.5 lakh have been diverted to cotton demonstration. 100% of the physical targets have been achieved and 64% of the financial budget under the scheme has been utilized.

Although in CDP 2015-16 no fix targets for poplar was fixed under agro forestry, yet 4.8 hectares have been cropped under the scheme with the assistance of Rs. 48000 provide under the same. As a result, During CDP 2016-17, Rs. 1.44 lakh have been assigned for poplar plantation targeting 14.4 hectares of land. 100% of the physical and financial targets have been achieved during 2016-17.

Under farm mechanization, 23% of the physical targets and 52% of the financial targets have been achieved. However, the physical targets have been cut-short by 79% and financial target by 43% in the next CDP during 2016-17. Dhaincha seeds distribution and contingency for awareness have proved to be a successful initiative, with almost 100% physical and financial achievements in the two consecutive years. Overall. 63% and 51%o of the financial targets have been achieved during CDP 2015-16 and CDP 2016-17 respectively.

During CDP 2015-16, in Sonipat no provision for Agro forestry with poplar plantation was made, however Rs. 48000 has been utilized for cropping an area of 4.8 hectares under poplar. Similarly, no targets were set for Rotavator, yet Rs. 53.8 lakh

have been diverted to subsidize the purchase of 269 Rotavator to other beneficiaries against a subsidy of Rs. 20000 against every purchase.

For the CDP- 2016-17 in Sonipat, Rs. 3.15 lakh have been utilized against the subsidy on 5 Straw Reaper and Rs. 1.26 lakh utilized against the subsidy on 2 Laser Land leveler at 50% subsidy on the purchase cost for SC/St/Small & Marginal farmers. Also, no targets were fixed in the following; Rs. 3.20 utilised to subsidise 16 Rotavator, Rs. 5.64 utilised to subsidise 47 Zero Till Seed cum Fertilizer Drill, Rs. 2.5 lakh for 5 Laser Land leveler and Rs. 4 lakh against 8 Straw Reaper at 40% subsidy against the purchase cost.

Table - 4.19: Progress Report of CDP in Ambala (area in hectare)

	Maize					
	Physical Target	**Target Achieved**	**%**	**Financial target**	**Achieved**	**%**
2016-17	1428.8	269.5	18.861	74	13.475	18.2094
	Inter-cropping					
	500	48.6	9.72	25	2.43	9.72
	Farm mechanization	32		79.17500	23.64000	29.85
	Contingency					
	22	22	100	12.2	10.29	84.344
	Total				49.85175	

In Ambala, 18% of the physical target and 18% of the financial targets for maize demonstration were achieved under CDP 2016-17. Out of 500 hectares targeted under inter-cropping, 9.7% was achieved and out of Rs. 25 lakh proposed 9.7% of the funds have been utilized. Under farm mechanization, out of the targeted Rs. 79.17 lakh, 29.8% could be utilized in subsidizing the purchase of farm implements in Ambala. 100% of the physical targets and 84% of the financial targets have been utilized under Contingency and awareness on innovation in farming.

Table - 4.20: Progress Report of CDP in Jind (area in hectare)

	Target Physical	**Achieved Area**	**% Area**	**Target Financial**	**Achieved Financial**	**% Financial**
Alternate Crop Demonstration						
Maize						
2015-16	1200	1200	100	60	58.1	96.8
2016-17	39.2	33.6	85.7	1.86	1.68	90.3
%Change	-96.7	-97.2		-96.9	-97.1	
Farm Mechanisation						
2015-16	744	584	78.5	171.3	161.8	91.4
2016-17		353			27.9	
%Change	-100	-39.5			-82.7	
Contingency for Awareness Training, Implementation, Monitoring Etc						
2015-16	8	8	100	4.55	4.45	99.7
2016-17	24	24	100	10.6	10.6	70.9
%Change	200	200		134.1	139.1	
Total						
		Budget estimated		Budget Utilized		
	2015-16	235.8		224.4		95.1
	2016-17			40.2		

In Jind district 100% of the physical targets for maize demonstration were achieved during 2015-16 and 96% of the financial targets have been utilized. In CDP 2016-17 the physical targets have been reduced by 96% and financial assistance under the same has been reduced by 96% in the next year. The targets achievement, both physical and financial are 85% and 90% during CDP 2016-17, however, as asserted earlier it is crucial to note the steep decline in the annual targets between 2015-16 and 2016-17. 78% of the physical targets and 91 % of the financial targets have been achieved during CDP 2015-16, while in CDP 2016-17, 353 beneficiaries have been benefited with Rs. 27.9 lakh subsidy on various implements. 100% of the physical targets for contingency and awareness have been achieved during 2015-16 and 2016-17. IN 2015-16, 95% of the budget allocated has been utilized.

Table - 4.21: Progress Report of CDP in Panipat (area in hectare)

	Target A	**Achieved**	**%**	**Target F**	**Achieved F**	
Alternate Crop Demonstration						
Maize						
2015-2016	800	800	100	4234000	4234000	100
2016-2017	1000	15.8	1.58	1	0.79	79

Agroforestry						
2015-2016	14	14	100	140000	14000	10
2016-2017	60	45.6	76	6	4.56	76
Farm Mechanization and Value Addition						
2015-2016	104	92	88.4615385	5737000	5356000	93.5
2016-2017	113	113	100	35.79	35.79	100
Site Specific Activities						
Dhaincha						
2015-2016	4000	4000	100	3648000	3648000	100
2016-2017	5200	5200	100	13.26	13.26	100
Contingency for Awareness Training, Implementation, Monitoring Etc						
2015-2016	6	1	16.6666667	4.25	2.32682	54.7
2016-2017	18	18	100	9.75	9.72	99.6
Total						
	Target		Utilized		%	
2015-2016	13759004		13378002		97.2308897	
2016-2017	65.91		64.12		97.2841754	

In Panipat, 100% of the physical and financial targets have been achieved during 2015-16, during 2016-17, 1.5% of physical and 79% of the financial targets were achieved. 100% of the physical targets and 10% of the financial targets under agro forestry have been achieved in 2015-16 and in 2016-17, 76% of the physical and financial targets were achieved. Rs.57.37 lakh were allotted for farm mechanization during 2015-16, 93% of the amount has been utilized benefitting 104 farmers. In 2016-17 Rs. 35 lakh benefitted 113 farmers; 100% of the physical and financial targets have been achieved during this year.

Dhaincha seed distribution achieved 100% physical and financial targets in 2015-16 and 2016-17. Under contingency and awareness, training and implementation 100% of the physical targets have been achieved during 2016-17 as compared to 16% achievement in 2015-16. Also, 99% of the financial targets have been achieved during 2016-17as compared to 54% in 2015-16. In total, 97% of the financial targets have been achieved in 2015-16 and 2016-17.

An analysis of the data gathered from the field reveals that throughout the districts farmer have faced the problems of low MSP and poor procurements of the alternative crops. Approximately 89% of the farmers in all the districts have been

receiving regular MSP which is, however, limited to paddy and wheat crops. However, 55% of the farmers engaged in cropping alternative crops such as; maize, oilseeds, bajra, barley, pulses and cotton said that they were able to sell their respective produce in local markets. 45% of the farmers who grew alternative crops faced difficulty in selling the produce in local markets. The constant fluctuation in prices, especially during harvesting of pulses, sunflower and mustard has discouraged the farmers from growing these crops and revert back to growing paddy, wheat and vegetables. 72% of the farmers who grew and sold maize, oilseeds, bajra and other alternative crops were found dissatisfied with the market price.

The role of middlemen in the entire process of agricultural transactions has been pointed out as exploitative yet compulsive. As already discussed, also during the FGDs with the farmers it was told that a large section of farming community especially marginal, small, semi-medium and medium landholders still rely upon the local moneylender for agricultural loans. The loans are often given against paddy and wheat cropping, since alternative crops are not considered profitable by the moneylenders. Secondly, the same moneylender then operates as the middlemen during the later phase. As the crop is harvest ready, the farmers are bound to sell-off the produce to the same moneylender operating as procurement agent/ middleman. The financial dilemma despite all the efforts and loan schemes operated by the government has persisted in the rural agriculture scenario.

A poor procurement for alternative crops has led the farmers refrain from cultivating alternatives crops. The procurement on behalf of government agencies has been rated poorly by the farmers. 98% of the farmers said that procurement was severly inadequate for the alternative crops whenever they grew in the past. The farmers also revealed discrepancies in private procurements by the middlemen or other agents. These agents look out for reasons to buy the crop at low cost; moisture in crop is often cited and hence the produce is bought at lower cost.

Sheer dearth of proper input support, inadequate and delayed procurement, agricultural loan and lower MSP has been major inhibiting factors for decreasing cultivation of alternative crops. (see also, Shergill 2005, Raju & Chand 2008, Pathak 2017). Additionally, the procedural complexities involved in documentation have hindered the farmers from opting to the government schemes. The farmers are compelled to buy loan from Aarhtiya (commission agent) / *baniya* (local moneylender) over banks due to several procedural barriers. They are forced to sell agricultural produce to

Aarhtiya (local middleman) than selling them directly in a *mandi*, because of delay in procurement, rejection of crop due to quality issues, and often non procurement of crops. A recent news item reported farmers saying that "Just as a body must be cremated and cannot be brought back home, so must farm produce be sold." Once the farmer reaps the harvest and takes it to the market, he wants to sell it even at the low price because returning with the unsold crops will have additional transportation thus reducing his profit margin. Moreover, farmers find difficult to store the crops and hold them for longer time because they need earliest input recovery to be repaid to the creditors. Under this vicissitudes of crisis, are forced to sell their produce cheaply.[2]

[2] Pathak, Vikas. (2017). Stuck with harvest, farmers turn to traders, The Hindu, Chandigarh Edition, 09 July.

Chapter V
Concluding Observation and The Way Forward

Based on the information received from the field and suggestions from various stakeholders, the following recommendations and feedback have surfaced as probable policy inputs to the ongoing diversification of agricultural crops in the state.

At the foremost, it was essential to identify the primary concerns for promoting diversification; and then focus on the imperatives taking shape in Haryana. The primary agricultural concern has been the depleting groundwater level, soil infertility and rising pollution due to the use of chemical fertilizers. Secondly, the widespread cropping of paddy and overall inability of the alternative crops such as maize, oilseeds, and pulses to replace paddy is another major concern. Therefore, the suggestions and recommendations from the field study are compiled in an order to de-construct the concerns and then address them one by one.

CDP over the years

In 2013-14 the state of Haryana introduced CDP; between 2012-13 and 2013-14, and the area cropped under paddy increased by 38300 ha (3.17%) and maize decreased by 1400 hectares (14.14%). It was noticed that during 2013-14 and 2014-15 area cropped under paddy increased by 33300 ha (2.67%) and maize recorded a jump of 300 ha (3.5%). In the next year, 2014-15 and 2015-16 paddy increased by 76100 ha (5.95%) and maize slumped by 2800 ha (31%). Due to poor yield in some regions and an overall flattening of market prices the farmers at large refrained from further experimenting and opted sure and safe crops during 2015-16.

The official Action Plan document records poor performance of maize demonstration in 2016-17, largely due to introduction of online registration system. Across the districts, farmers and agricultural extensions officers informed that since most of the farmers are not computer literate and their hesitation to provide basic information about the land holdings resulted in the minimal achievement of targets.

Also, over the years farmers' inhibitions towards maize as a suitable replacement to paddy have developed in the state. The component under maize demonstration recorded an all time low of 1513 hectares. Only 6% of the physical targets and 6% of financial targets could be achieved during CDP 2016-17. However, the actual figures of total area cropped and production of maize and paddy during 2016-17 can only be ascertained after the State Statistical Abstract is released.

A majority of the farming population in Haryana comprises of marginal and small famers. Majority of the marginal and small cannot afford to shift from an economically safe crop like paddy to experiment with maize. Therefore, most of them did not avail to the first component under CDP. Only progressive farmers with a decent land holding applied and gained from the scheme. The second component assured heavy implements and tractor based farming equipments also failed to attract the marginal and small farmers because of high input cost and maintenance.

Subsidy for UGPL under Site Specific Activities component did not attract farmers. The farmers were suspicious of the quality of pipes available under the scheme which was claimed to be available at an inflated price. Many of the farmers abstained from availing the scheme and rather they purchased cheaply available pipes from the market. This component has been excluded from the plan of action of CDP 2017-18.

Distribution of dhaincha seeds found few takers in the state. However, the farmers have welcomed the move and demanded inclusion of other organic inputs such as vermin compost into the programme.

The fourth component on contingency and awareness and training is the most efficient of all the components. Due to the high number of krishi mela and gosthi at block, district and state level; farmers were found aware of new equipments/implements, new variety of seeds and pesticides varieties.

Evidently, the diversification schemes suffer from the 'poor launch syndrome'. It can be observed that diversification programmes received a cold shoulder by the farming community, especially the small land holders who cannot afford experimentation in agriculture. On the condition of unanimity, many of the ground level agricultural officers

asserted that the targets set under CDP were ambitious with inadequate infrastructure of their implementation, such as, shortage of staff, no or limited office infrastructure for Agriculture Development Officers, delayed reimbursement of subsidy etc.

Statistical Discrepancies

Significant contradictions in figures have been documented in the State Statistical Abstract of Haryana and the CDP Action Plan document. According to a recent report titled "Monitoring and Evaluation of CDP in Original Green Revolution States" the Action Plan of 2013-14 shows that paddy has been replaced with maize in 13427 hectares. However, the Statistical Abstract Haryana reports an overall acreage of maize during the same year to have exceeded not more than 8500 hectares.

The mismatch in figures point at a larger gap between planning, ground implementation and assessment pedagogy. Secondly, as soon as the farmer obtains benefits under crop demonstration, his/ her land is punched as 'cropped with maize 'in the official rolls. During the field survey many farmers confessed of not sowing the maize seed received under the scheme. Major portion of the maize seeds were used as livestock fodder. In Kurukshetra, disappointed with the growth of maize plants, many farmers were forced to harvest maize crop at a premature stage. Farmers in Sirsa, and Fathehabad suggested unsuitable land and climatic conditions as the major reason to abstain from growing maize, yet some of them availed subsidy on maize seeds to eventually use them as fodder. Also, low market returns, inadequate procurement and high risk of crop failure restricted the farmers from growing maize.

Low commercial value of Agriculture

It is important to consider and understand the commercial viability of agricultural practice. During group discussions, majority of the farmers admitted that they are forced to grow safer crops like paddy and wheat despite knowing the consequences of inappropriate exploitation of natural resources and extended health hazards due to excessive use of pesticides. It is needed that agriculture is seen as an enterprise which needs returns on the capital. Since most of the farmers reported loss in their farm output they had to borrow loans to repay their input dues. Small and medium farmers often use agriculture loans to meet non agricultural expenses, such as wedding, construction of house and payment of education fees etc.

The hassling documentation needed for bank loans and delayed payments from the local vendors have rendered the entire situation very complex. In addition to the loan taken under KCC, as the sowing season comes close by the farmer is left with no option but to approach the local *aarthiya* who gives loans on high interest rates.

Inadequate procurement and delay in payments and a big share of the profit being taken away by middlemen and traders have resulted in the present state of financial insecurity among the farming community. A farmer as an institution needs to look after himself and his dependent workforce and family members to sustain a decent life. Somehow, it seems the complex web of financial insecurity in farming is what has kept the farmers entangled in the vicious circle of sowing, caretaking, reaping, storage, transporting and selling.

It has been found during the study that despite various state led interventions, poor procurement and low MSP of non-paddy-wheat crops remains the major factor restricting the farmers from large scale production ofmaize, oilseeds, cotton and pulses etc. However, these crops are general ingredients of the regular dietary pattern in India, especially the Northern region. There is a greater need of developing area and crop specific processing units so as to enable farmers to sell their produce locally at adequate price.

State run procurement is usually delayed for all crops, leaving the farmers at the mercy of the local vendors who procure at prices below MSP, and farmers are forced to sell since it is logical to sell than bear the logistics costs. Moreover, quite often farmers fail to sell their produce due to the poor quality cited by the procurement agencies. The procurement is poor for all crops, including paddy and wheat, but due to high demand of paddy and wheat, farmers are able to obtain decent price from. On the other hand they fail to find suitable market for maize, onions and tomatoes during low demands.

Due to the highly volatile market of pulses and the reported cartelization of pulses in media discourage farmers from indulging in growing pulses; as a result most of the farmers in Haryana have been growing pulses for household consumption only.

As far it is confirmed that the existing food processing units are already receiving sufficient and quality raw products from other states. In that case it is required that the state either increase the number of processing units (state run or private), since consumption of finished goods is a never ending process or enforce local procurements over existing food processing units in the state. There can be two alternatives at the in short run: establish, develop and manage food processing units as an extension to Vita dairy enterprise (under Haryana Dairy Development Cooperative Federation Limited), or collaborate with private processing companies and encourage them to buy raw products from the state and levy interstate taxes on raw food materials coming from other states. Corn starch units in Haryana can be a potential sector to presently focus at. An initial gaze in Haryana reveal a number of corn starch processing units catering to the demands in pharmaceutics, paper, textile, and other consumer based industries.

In across the districts under study it was found that contract farming and farmer producer organizations were non-existent. Many of the farmers were unheard of these cooperation agencies. The government of Haryana needs to promote establishment and efficient functioning of these coordinating agencies which can safeguard farmers based on the principles of cooperative development. It is also found, the number of small land holders have increased. The concept of Joint families is dwindling leading to internal divisions of lands that paves way for competition within families. For instance, due to open competition and popler woods from adjoining states have drastically lowered the popler prices in Yamunanagar, thus resulted into stark decline in popler plantation. To promote agro forestry along with intercropping, farmers' interests need to be safeguarded. In this direction, contract farming and cooperative organisations could play a vital role (for more details see, Singh 2004, 2008)

During the field interactions farmers also complained about the abundance of *Neel Gai* (blue bull) and other stray cattle that have been a limiting factor in agriculture diversification (though some agricultural official considered it a nonissue). It was informed that these stray animal roam in herds and damage the crops. Unable to find an effective breakthrough to deter them, the farmers in these regions have abstained from growing pulses and maize, since the crop is more prone to damage by these trespassing animals.

Administrative and Institutional Reforms

The concerned officials suggested a 'single window' system for effective delivery and implementation of agricultural schemes. In most of the instances different departments were found engaged in similar or complementary schemes in terms of their respective aims and objectives. It was suggested by the officials of agriculture thus recommend a mandatory scrutiny of various schemes to be launched by different departments; such as agriculture, horticulture, ground water, soil conservation, irrigation and public health etc to avoid the repetitions and clashes in their overall functioning. Also, it is suggested improving the inter-department communication by setting up an inter–departmental panel/committee that should meet every 6 months to discus, collaborate and sort out the duplication of implementation of schemes and programmes.

A suggestion proposed by a high level agricultural officer goes in consonance with the need to evolve the farm and infrastructure by following an Area specific plan. Developing area specific cropping and promoting processing units in these regions may solve the issues in procurement and MSP. The idea is to develop specialized agriculture zones for specific crops rather than entire state getting specialized under one or two crop. For instance, Kurukshetra with immense potential can be turned into a sunflower, rapeseed and mustard zone. Similarly, Fathehabad and Sirsa with adequate geo-climatic conditions can support Kinnow and Cotton cultivation. Developing crop-specific centres complimented with processing units if run effectively can be a promising breakthrough to the issues of procurements and MSP. Region wise specialization along with industrial demands is expected to raise the quality and quantity parameters, which then can be a driving force in collectivization of farmers aimed at increasing the profits. The collectivization of farmers either under Farmers/Producers Organization or co-operatives or a conglomerate of these can help in facing the competition from big players.

A very low fraction of farmers were aware about the concepts of contract farming and majority of them had reservations with the idea of growing and selling under the contract farming model. It is thus needed that adequate guidance is ensured to the farmers on the significance of progressive agricultural models during annual *Kisan Mela* and *Kisan Ghoshti* being organized at state district and block level.

Impact of Introduction of Online Registration for DBT

The physical targets achieved under cluster demonstration fell from 68% in 2015-16 to 9% in 2016-17. During 2015-16 the physical targets were effectively achieved. The extension officers directly distributed seed and fertiliser kits (including DSR) at the village level. However in 2016-17 the introduction of online system the farmers could not fill/submit the applications due to lack of technical understanding/awareness and other technical issues. In most of the districts farmers and officers have shown enthusiasm on the introduction of online registration portal. During interaction a mixed response was received; some found it cumbersome and prone to corruption while others thought that online system would help in tapping fake registrations. Most of the farmers in the villages are illiterate and do not have access to internet facilities, thus barring them from getting them registered online at least in the initial years.

The officials also expressed their helplessness in case of 'multiple registrations' by members of a single household. Over-crowding of online portal restricted the subsidy benefits to limited users on a first-come-first-serve basis. It may be suggested that the online registration should not be 'closed' unlike the present system where it stops registering after it crosses ten percent over the target area. Instead registration should continue irrespective of the number of applicants, since there is a fare chance of many applications being rejected on various grounds. All the applications should then be inspected and approved by the local officials and extension officers to weed out ineligible or fake claimants.

It was also observed and also corroborated by the agriculture extension officers that farmers prefer 'in-hand' money/benefits, as it was practised earlier, than waiting for months to be reimbursed their investments on farm inputs. In some cases the computer operators at 'form filling center' (private cyber cafes) have been known to indulge in illicit activities to earn some extra money. Government's initiatives in this direction to ensure that the site remains open irrespective of the number of applicants can help tackle the ongoing concern of multiple applications by a single candidate.

Despite, much stress because of online system and its consequences, it is noteworthy to mention the proactive teamwork showcased by the officials and extension workers in some districts. The ADOs have themselves helped the villagers in filling up

the online forms, encouraging the farmers to opt for a transparent and user friendly mode of application. As a result, for instance, Sirsa district achieved 49.5% of physical targets in crop demonstration against the state average of 6% during CDP 2016-17. Online is not a problem since educated youth of villages may be trained to register online and ADOs can a play a vital role in this direction.

Farm mechanization

As discussed in previous chapters, the subsidy on farm implements has been a major component under the Crop Diversification Program. Mechanization of farming has been sought to solve the ongoing labour crises, enhance work efficiency and also function to tackle the stubble burning in the state. In 2016-17, 29% of the financial targets under farm mechanisation component have been achieved in Haryana.

Information gathered from the field reveal that majority of the marginal and small farmers have abstained from availing the scheme due to huge investments required for purchase and their maintenance round the year. Also, the progressive farmers who have been availing the schemes have bought all possible equipments, leading to saturation on their part. Since the sowing period in each season is generally short of about a month, it becomes unviable for small farmers to withhold the implements for rest of the year.

Therefore, instead of promoting purchase of implements to the individual farmers, 'implements bank' at the block/village levels could be a viable option/ alternative. Also, for example in Sirsa, marginal and small landholders have benefitted from 'custom hiring' of farm implements, whereby they are provided implements against a nominal fee. Villagers in all the districts have shown their interest in the establishment of 'implements bank'.

Miscellaneous

There is also a need to revise the list of priority implements. Happy seeder and zero till seed drill perform almost same functions, either of the one should be subsidized to allow subsidy on other components. As also already popularised farm implements should be phased out from the action plans.

It is suggested that rather than setting up district level targets, allotment of block level targets would prove more feasible and better serve the objectives of diversification programmes.

Most of the agricultural officers working at the village levels lacked basic amenities such as support staff and transport to carry out extension tasks in the remote villages. The lack of basic amenities at ground level restricts the officers from bringing out desirable and efficient results. Adequate provisions should be provided to the extension workers at the village level; be it in form of infrastructure, vehicles and support staff to carry out their official duty efficiently and proactively.

As discussed in Chapter IV, except for loans taken under KCC, the percentage of farmers availing loans from institutional sources is minimal due to cumbersome procedure involved in the process. Farmers find the documentation procedure cumbersome and instead prefer approaching the local money-lenders. The landless farmers operating on leased lands do not qualify to avail benefits under agricultural schemes like CDP. The landless tenant farmers asserted that they should also be given benefits for loans, subsidy and irrigation facilities.

It is advocated that the Minimum Support Prices should be extended to all the crops which are intended to be promoted against paddy. Adequate MSP and efficient and timely procurement on such crops shall encourage farmers to opt the idea of crop diversification.

The farmers involved in agro forestry suggested that the duration of subsidy for poplar should be increased from 3 to 5 years as popler plantation need constant care such as trimming, manure and protection from pests which are cost intensive. Since that selling price of popler has decreased significantly farmers found it unsustainable to further increase the acreage of popler.

A majority of the farmers in all the districts informed about the adequate electricity supply for irrigation. However a small share of farmers demanded increased hours of electricity supply during peak seasons.

Water logging on the fields and saline water is another major concern in agriculture. As a result ground water has turned unsuitable for irrigation in some areas. For instance in Sonipat district, farmers stressed to be linked through surface irrigation networks (canal) to tackle the issue of saline water.

It was also observed that PB-1509 (Pusa Basmati) if promoted can contribute significantly in controlling the current resource crises related to paddy cultivation. However, PB-1509 fetches low MSP in the market when compared to PB-1401(the 'Muchhal basmati'), Pusa 1121 and other presently listed 'A grade' paddy varieties. It was reported that PB-1509 can be harvested in 90-95 days in comparison to PB-1401 which takes 100-120 days, also consumes comparatively more water, fertilizers and pesticide inputs. Thus, the total input cost incurred in PB-1509 ranges is much lower than the latter variety of paddy.

Since varieties like PB-1509 takes less time in harvest, it allows the farmer with a sufficient time window (20-25 days more) before sowing the next crop. During this extra time paddy straws can be allowed to decompose on its own, largely limiting the problem of stubble burning. Overall there is a 36 days gap between the two crops, PB-1509 usually sown by 15th July, which is due time for the arrival of monsoons in Haryana, facilitates water conservation. The crop is sown late and reaped earlier, has multiple advantages yet awaits a crucial intervention from the state. Policies and implementation of diversification of agricultural crops are in shackles due to problems of usury. It becomes the sole responsibility of the state to extend financial 'assurance' to the farming community. The farming community needs assurance of sustainable livelihood, before taking on any agricultural experiment.

The current strategy aims to increase 'overall production' by promoting 'total area cropped' via subsidized capital investment in input costs. Providing subsidized seeds, fertilizers and equipments (on an average 53% of the funds are being utilized and the rest remains unutilised) is not yielding expected results. Therefore, to ensure that farmers put in heart and soul in crop diversification, a policy of proportionately higher MSP over the concerned crops supported by efficient procurement and market price support in form of MSP can help the state towards an inclusive and holistic Action Plan.

Additionally, the level of awareness being provided in the fairs is limited to introducing new seeds, fertilizers and equipments available in the markets. But there are hardly any efforts on revolutionizing the farmer into modern farming and marketing practices. Prioritisation of post-production marketing through cooperative organizations shall promote diversification among majority of small and marginal farmers.

Policy Recommendations

- Procurement of alternative crop should be made on time with minimal rejection rate of crops because in case of non-procurement, farmers fail to get adequate market price, especially during low demand seasons, for maize, onions and tomatoes etc.

- Volatilely of market prices for pulses should be minimised and the reported cartelization of pulses in media must be checked on urgent basis so as instil confidence among farmers to grow pulses.

- To avoid the market volatility, 'price rationalisation' system may be opted. In case the crop is not procured by the state agencies, the farmer should be compensated with the difference of selling price of the market and the MSP.

- It is advocated that the Minimum Support Prices should be extended to all the crops which are intended to be promoted against paddy and list of MSP should be frequently updated.

- Rational and controlled demand driven cultivation should be encouraged to help reap profits by the farmers and to avoid the complex web of financial insecurity in the vicious circles of sowing, caretaking, reaping, storage, transporting and selling.

- A 'single window' system for effective delivery and implementation of agricultural schemes should be developed to avoid duplicity of similar or complementary schemes in terms of their respective aims and objectives.

- A mandatory scrutiny of various schemes should be done collectively by different departments to avoid the repetitions and clashes in their overall functioning.

- Improvement of inter-department communication is needed by setting up an inter–departmental panel/committee that should meet every 6 months to discus, collaborate and sort out the duplication of implementation of schemes and programmes.

- It is needed to promote establishment and efficient functioning of contract farming practices and cooperative groups like farmer producer organizations, which can safeguard farmers based on the principles of cooperative development.

- To encourage agro forestry, the duration of subsidy for poplar should be increased from 3 to 5 years as popler plantation need constant care such as trimming, manure and protection from pests which are cost intensive.

- To safeguard the interest of farmers, a 'long term lease/rent act' may be enacted. Such Act will instil confidence among farmers that even his land will remain sage even if he lends his land for long term contract farming or cooperative farming.

- It is needed that adequate guidance is ensured to the farmers on the significance of progressive agricultural practice based on contract and cooperative farming during *Kisan Mela* and *Kisan Ghoshti* being organized at state, district and block levels.

- An Area Specific Agriculture Plan should be prepared to promote area specific cropping and processing units in the state to mitigate the issues in procurement and MSP. In this regard, specialized agriculture zones for specific crops should be developed. The collectivization of farmers either under Farmers/Producers Organization or co-operatives or a conglomerate of these can help in facing the competition from big players.

- It is needed either increase the number of processing units (state run or private), since consumption of finished goods is a never ending process or enforce local procurements in existing food processing units in the state.

- Alternatives in short run, food processing units may be established, developed and managed as an extension to Vita dairy enterprise (under Haryana Dairy Development Cooperative Federation Limited), or collaborate with private processing companies and encourage them to buy raw products from the state.

- Corn starch units in Haryana can be a potential sector to focus at. An initial gaze in Haryana reveal a number of corn starch processing units catering to the demands in pharmaceutics, paper, textile, and other consumer based industries.

- Under the online registration system mechanism should be developed to deter 'multiple registrations' by members of a single household.

- It is suggested that the online registration should not be 'closed' unlike the present system where it stops registering after it crosses ten percent over the target area. Instead registration should continue irrespective of the number of applicants, since there is a fair chance of many applications being rejected on various grounds as also to avoid overcrowding of the portal.

- All the applications should be inspected and approved by the local officials and extension officers to weed out ineligible or fake claimants.

- The reimbursement process should be streamlined so that farmers get their due on time and they do not have to wait for months to be reimbursed their investments on farm inputs.

- The agriculture extension officers should be provided with computer sets along with internet facility to encourage online registration under various agricultural programmes. Educated village youths can also a play a vital role in this direction.

- Since the sowing period in each season is generally short of about a month, it becomes unviable for small farmers to withhold the implements for rest of the year. Therefore, instead of promoting purchase of implements to the individual farmers, 'implements bank' at the block/village levels could be a viable option/ alternative. Also, 'custom hiring' of farm implements, whereby they are provided implements against a nominal fee can be promoted.

- There is also a need to revise the list of priority implements. Happy seeder and zero till seed drill perform almost same functions, either of the one should be subsidized to allow subsidy on other components. As also already popularised farm implements should be phased out from the action plans.

- It is suggested that rather than setting up district level crop demonstration targets, allotment of block level targets would prove more feasible and better serve the objectives of diversification programmes.

- Adequate infrastructural support such as, proper office space, vehicles, support staff, computer sets etc., should be provided to ground level agricultural officers to work efficiently and proactively.

- Cumbersome documentation process should be done away to promote institutional credit system.

- The current strategy aims to increase 'overall production' by promoting 'total area cropped' via subsidized capital investment in input costs. A policy of proportionately higher MSP over the concerned crops supported by efficient procurement and market price support in form of MSP can help the state towards an inclusive and holistic Action Plan.

- Dhaincha seeds and vermicompost should be further promoted to help improve soil fertility.

- Though the practice of stubble burning is decreasing strict legal measures should be taken against the violators.

- To control underground water depletion, water logging on the fields and saline water in some districts, surface irrigation networks (canal) can be promoted.

- Less time and water consuming varieties of rice like PB-1509 (Pusa Basmati) should be promoted and it should be included in the 'A grade' listed paddy varieties.

- Agro-industries in the state has immense potential of growth based on both traditional crops as well as high value crops like fruits and vegetables which may be promoted for better employment and incomes of the farmers.

- Allied sectors such as dairy, fishery and piggery could be a force multiplier towards crop diversification.

- Stray animals, mostly *Neel Gai* (blue bull) roam in herds and damage the crops. Crops should be protected from getting damaged by these trespassing animals.

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Annexure- I

Component & activity wise physical targets & financial allocation under Crop Diversification Programme in original green revolution states 2016-17 (Government of Haryana)

1	Cluster Demonstration of Alternate Crops		Physical Target	Financial Target
		Maize	25000	125000000
		Cotton	10000	75000000
		Agro-forestry poplar	1000	10000000
		Intercropping wheat	3240	16200000
		Total	39240	16297200
2	Farm Mechanization		3370	158350000
3	Site Specific Activities			
		UGPL	7840	109760000
		Dhaincha	59990	59990000
		Total	67830	169750000
4	Contingency and Awareness, Training, Implementation, Monitoring Etc		224	11300000

Annexure – 2: Average of Paddy and Wheat Concentration

Sl. No.	District	Agro Climatic Zone	2008-2009					2009-2010					2010-2011					Average of 2008-2011	2013-2014					2014-2015					2015-2016					Average of 2013-2016	Change in Area under Rice and Wheat cultivation	Intra-zonal crop intensity ranking
			Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation	Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation	Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation		Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation	Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation	Total Cropped Area	Area under Rice Cultivation	Area under Wheat Cultivation	Total	% land under rice and wheat cultivation			
			1	2	3	(2+3)	A	4	5	6	(5+6)	B	7	8	9	(8+9)	C		10	11	12	(11+12)	D	13	14	15	(14+15)	E	16	17	18	(17+18)	F			
	Ambala	I	203	75.2	82.2	157.4	**77.5**	206	81	83.6	164.6	**79.9**	207	82.3	86.9	169.2	**81.7**	**79.7**	206	82.6	87.2	169.8	**82.4**	199	79.4	86.5	165.9	**83.4**	207	83	88.3	171.3	**82.8**	**82.8**	**3.1**	IV
	Panchkula	I	42	7.1	15.7	22.8	**54.3**	47	8.8	15.5	24.3	**51.7**	39	8.4	15.7	24.1	**61.8**	**55.9**	44	9.5	16.9	26.4	**60.0**	44	9.8	17	26.8	**60.9**	44	9.9	17.6	27.5	**62.5**	**61.1**	**5.2**	II
	Yamunanagar	I	206	59.3	74.5	133.8	**65.0**	214	71.7	84.8	156.5	**73.1**	216	73.5	85.8	159.3	**73.8**	**70.6**	211	70	85.1	155.1	**73.5**	208	68.9	85.1	154	**74.0**	210	70.2	88.6	158.8	**75.6**	**74.4**	**3.8**	III
	Kurukshetra	I	274	114.5	112.3	226.8	**82.8**	274	121.5	115.1	236.6	**86.4**	283	118	114.2	232.2	**82.0**	**83.7**	265	110.7	112.7	223.4	**84.3**	272	117.9	111.6	229.5	**84.4**	288	130.8	112.8	243.6	**84.6**	**84.4**	**0.7**	VII

	Kaithal	I	381	152.1	173.1	325.2	**85.4**	385	156.3	171.9	328.2	**85.2**	380	158.3	171.7	330	**86.8**	**85.8**	385	162.5	172.3	334.8	**87.0**	380	157.9	173.6	331.5	**87.2**	381	161.5	175.2	336.7	**88.4**	**87.5**	**1.7**	V
	Karnal	I	388	167.2	168.6	335.8	**86.5**	395	169.1	172	341.1	**86.4**	389	171.5	171.4	342.9	**88.1**	**87.0**	389	170.2	172.8	343	**88.2**	380	161.9	171.7	333.6	**87.8**	391	172.5	173.9	346.4	**88.6**	**88.2**	**1.2**	VI
	Panipat	I	188	73.6	83.9	157.5	**83.8**	191	77.7	88	165.7	**86.8**	189	77	86.7	163.7	**86.6**	**85.7**	190	75.6	85.9	161.5	**85.0**	188	75.4	85.6	161	**85.6**	162	54.1	83.7	137.8	**85.1**	**85.2**	**-0.5**	VII
	Sonipat	I	295	71.3	141.1	212.4	**72.0**	301	92.7	143.6	236.3	**78.5**	297	90.2	141.4	231.6	**78.0**	**76.2**	286	88.3	141.8	230.1	**80.5**	290	100.4	143	243.4	**83.9**	282	88.1	147.3	235.4	**83.5**	**82.6**	**6.5**	I
	Rohtak	II	221	23.2	98.7	121.9	**55.2**	235	38.5	103.2	141.7	**60.3**	224	35.1	103.7	138.8	**62.0**	**59.1**	227	36.4	104	140.4	**61.9**	231	43.4	102	145.4	**62.9**	226	41.4	106.7	148.1	**65.5**	**63.4**	**4.3**	I
0	Faridabad +Palwal	II	220	29.2	103.9	133.1	**60.5**	259	35.6	127	162.6	**62.8**	258	40.3	132.5	172.8	**67.0**	**63.4**	255	40.8	127.1	167.9	**65.8**	257	45	126.8	171.8	**66.8**	259	45.2	132.7	177.9	**68.7**	**67.1**	**3.7**	II
1	Jind	II	471	95.3	213.4	308.7	**65.5**	470	106.9	215.2	322.1	**68.5**	467	108.3	215.2	323.5	**69.3**	**67.8**	470	114	215.9	329.9	**70.2**	472	119.6	217	336.6	**71.3**	476	123	218.9	341.9	**71.8**	**71.1**	**3.3**	IV
2	Hisar	II	631	37.6	227.1	264.7	**41.9**	648	48.5	223.1	271.6	**41.9**	606	43.2	225.2	268.4	**44.3**	**42.7**	631	42.2	231.5	273.7	**43.4**	662	45.2	225.6	270.8	**40.9**	654	47.8	229.9	277.7	**42.5**	**42.2**	**-0.5**	VI
3	Fatehabad	II	423	73.2	186.7	259.9	**61.4**	424	77.8	185.7	263.5	**62.1**	415	81.4	185.8	267.2	**64.4**	**62.7**	427	89.6	188	277.6	**65.0**	427	92.1	189.2	281.3	**65.9**	428	99.5	190.4	289.9	**67.7**	**66.2**	**3.5**	III
4	Sirsa	II	716	48.2	280.6	328	**45.9**	718	57.5	279.1	336	**46.9**	689	61.4	279.2	340	**49.4**	**47.4**	726	65.2	293.5	358.7	**49.4**	719	68.6	285.1	353.7	**49.2**	735	81.2	303.8	385	**52.4**	**50.3**	**2.9**	V

						.8					.6					.6																		
5	Jhajjar	III	239	18.8	98.8	117.6	**49.2**	238	33.9	93.7	127.6	**53.6**	232	26	101.1	127.1	**54.8**	**52.5**	225	23.1	95.9	119	**52.9**	235	30.6	97.9	128.5	**54.7**	239	35	113.9	148.9	**62.3**	**56.6**	**4.1**	I
6	Gurugram	III	116	2.6	51.1	53.7	**46.3**	114	3.4	48.8	52.2	**45.8**	117	4.4	51.6	56	**47.9**	**46.6**	105	4.5	44.6	49.1	**46.8**	110	5.1	48.5	53.6	**48.7**	105	5	48.9	53.9	**51.3**	**48.9**	**2.3**	III
7	Nuh/Mewat	III	225	8.5	98.1	106.6	**47.4**	172	7.1	71.4	78.5	**45.6**	173	6	73.7	79.7	**46.1**	**46.4**	156	4.1	71.7	75.8	**48.6**	178	5.1	74.4	79.5	**44.7**	173	6.6	76.6	83.2	**48.1**	**47.1**	**0.8**	IV
8	Rewari	III	199	0.8	50.9	51.7	**26.0**	197	2	45.8	47.8	**24.3**	192	2.1	48.6	50.7	**26.4**	**25.6**	182	2	44.6	46.6	**25.6**	191	1.9	44.7	46.6	**24.4**	193	2	49.7	51.7	**26.8**	**25.6**	**0.0**	V
9	Mahendragarh	III	275		46.9	46.9	**17.1**	253	0	42.6	42.6	**16.8**	268	0	40.7	40.7	**15.2**	**16.4**	285	0	42.9	42.9	**15.1**	288	0	46.4	46.4	**16.1**	289	0	49.6	49.6	**17.2**	**16.1**	**-0.3**	VI
0	Bhiwani	III	745	14.8	153.1	167.9	**22.5**	759	21.2	151.3	172.5	**22.7**	714	19	156.6	175.6	**24.6**	**23.3**	711	15	162.5	177.5	**25.0**	740	16.4	167.4	183.8	**24.8**	794	21.1	219.6	240.7	**30.3**	**26.7**	**3.4**	II

Annexure – 3

Category-wise farmers' loans from different sources in Yamunanagar

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	1.0	0.0	0.0	0.0	150000.0	100000.0	0.0	250000.0
	% Distribution	0.0	0.0	0.0	0.0	60.0	40.0	0.0	100.0
Marginal	Amount (Rs.)	6.0	0.0	400000.0	920000.0	100000.0	0.0	0.0	1420000.0
	% Distribution	0.0	0.0	28.2	64.8	7.0	0.0	0.0	100.0
Small	Amount (Rs.)	4.0	500000.0	50000.0	1100000.0	100000.0	0.0	0.0	1750000.0
	% Distribution	0.0	28.6	2.9	62.9	5.7	0.0	0.0	100.0
Semi-Medium	Amount (Rs.)	10.0	1450000.0	0.0	2420000.0	740000.0	550000.0	200000.0	5360000.0
	% Distribution	0.0	27.1	0.0	45.1	13.8	10.3	3.7	100.0
Medium	Amount (Rs.)	4.0	0.0	0.0	1400000.0	230000.0	0.0	70000.0	1700000.0
	% Distribution	0.0	0.0	0.0	82.4	13.5	0.0	4.1	100.0
Large	Amount (Rs.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Distribution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	Amount (Rs.)	25.0	1950000.0	450000.0	5840000.0	1320000.0	650000.0	270000.0	10480000.0
	% Distribution	0.0	18.6	4.3	55.7	12.6	6.2	2.6	100.0

Annexure - 4

Category-wise farmers' loans from Different sources in Kurukshetra

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Distribution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marginal	Amount (Rs.)	6.0	95000.0	0.0	590000.0	230000.0	0.0	215000.0	1130000.0
	% Distribution	0.0	8.4	0.0	52.2	20.4	0.0	19.0	100.0
Small	Amount (Rs.)	10.0	100000.0	0.0	3700000.0	150000.0	150000.0	0.0	4100000.0
	% Distribution	0.0	2.4	0.0	90.2	3.7	3.7	0.0	100.0
Semi-Medium	Amount (Rs.)	9.0	75000.0	0.0	2775000.0	1470000.0	0.0	455000.0	4775000.0
	% Distribution	0.0	1.6	0.0	58.1	30.8	0.0	9.5	100.0
Medium	Amount (Rs.)	2.0	0.0	0.0	520000.0	0.0	0.0	0.0	520000.0
	% Distribution	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Large	Amount (Rs.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Distribution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	Amount (Rs.)	27.0	270000.0	0.0	7585000.0	1850000.0	150000.0	670000.0	10525000.0
	% Distribution	0.0	2.6	0.0	72.1	17.6	1.4	6.4	100.0

Annexure – 5

Category-wise farmers' loans from different sources in Fathehabad

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	% Distribution	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marginal	Amount (Rs.)	4.0	0.0	0.0	225000.0	120000.0	0.0	63000.0	408000.0
	% Distribution	0.0	0.0	0.0	55.1	29.4	0.0	15.4	100.0
Small	Amount (Rs.)	4.0	0.0	0.0	600000.0	150000.0	0.0	20000.0	770000.0
	% Distribution	0.0	0.0	0.0	77.9	19.5	0.0	2.6	100.0
Semi-Medium	Amount (Rs.)	5.0	600000.0	0.0	3165000.0	1450000.0	0.0	280000.0	5495000.0
	% Distribution	0.0	10.9	0.0	57.6	26.4	0.0	5.1	100.0
Medium	Amount (Rs.)	11.0	0.0	250000.0	12350000.0	1250000.0	0.0	710000.0	14560000.0
	% Distribution	0.0	0.0	1.7	84.8	8.6	0.0	4.9	100.0
Large	Amount (Rs.)	3.0	0.0	0.0	1380000.0	0.0	0.0	0.0	1380000.0
	% Distribution	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Total	Amount (Rs.)	27.0	600000.0	250000.0	17720000.0	2970000.0	0.0	1073000.0	22613000.0
	% Distribution	0.0	2.7	1.1	78.4	13.1	0.0	4.7	100.0

Annexure - 6
Category-wise farmers' loans from different sources in Kaithal

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	0	0	0	0	0	0	0	0
	% Distribution	0	0	0	0	0	0	0	0
Marginal	Amount (Rs.)	5	0	0	402000	1000000	0	0	1402000
	% Distribution	0	0	0	29	71	0	0	100
Small	Amount (Rs.)	5	300000	0	1170000	250000	50000	0	1770000
	% Distribution	0	17	0	66	14	3	0	100
Semi-Medium	Amount (Rs.)	10	0	0	7350000	2250000	0	0	9600000
	% Distribution	0	0	0	77	23	0	0	100
Medium	Amount (Rs.)	2	0	0	1300000	1000000	0	0	2300000
	% Distribution	0	0	0	57	43	0	0	100
Large	Amount (Rs.)	0	0	0	0	0	0	0	0
	% Distribution	0	0	0	0	0	0	0	0
Total	Amount (Rs.)	22	300000	0	10222000	4500000	50000	0	15072000
	% Distribution	0	2	0	68	30	0	0	100

Annexure -7

Category-wise farmers' loans from different sources in Sirsa

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	0	0	0	0	0	0	0	0
	% Distribution	0	0	0	0	0	0	0	0
Marginal	Amount (Rs.)	2	0	0	125000	900000	0	0	1025000
	% Distribution	0	0	0	12	88	0	0	100
Small	Amount (Rs.)	4	0	0	900000	500000	0	40000	1440000
	% Distribution	0	0	0	63	35	0	3	100
Semi-Medium	Amount (Rs.)	8	0	0	2320000	700000	0	112000	3132000
	% Distribution	0	0	0	74	22	0	4	100
Medium	Amount (Rs.)	11	0	0	9400000	1150000	0	50000	10600000
	% Distribution	0	0	0	89	11	0	0	100
Large	Amount (Rs.)	3	0	0	1550000	600000	0	200000	2350000
	% Distribution	0	0	0	66	26	0	9	100
Total	Amount (Rs.)	28	0	0	14295000	3850000	0	402000	18547000
	% Distribution	0	0	0	77	21	0	2	100

Annexure - 8
Category-wise farmer loans from Different sources in Sonipat

Type of Farmers		No of Farmers	Govt. Banks/Cooperative Banks	Private Banks	Kisan Credit Card (KCC)	Private Money Lenders/Aarthiya	Relatives and Friends	Society	Total
Land less	Amount (Rs.)	0	0	0	0	0	0	0	0
	% Distribution	0	0	0	0	0	0	0	0
Marginal	Amount (Rs.)	5	0	0	800000	530000	0	0	1330000
	% Distribution	0	0	0	60	40	0	0	100
Small	Amount (Rs.)	6	0	0	2520000	0	0	0	2520000
	% Distribution	0	0	0	100	0	0	0	100
Semi-Medium	Amount (Rs.)	7	0	0	2450000	0	0	95000	2545000
	% Distribution	0	0	0	96	0	0	4	100
Medium	Amount (Rs.)	4	0	0	4900000	0	0	0	4900000
	% Distribution	0	0	0	100	0	0	0	100
Large	Amount (Rs.)	1	0	0	2500000	0	0	60000	2560000
	% Distribution	0	0	0	98	0	0	2	100
Total	Amount (Rs.)	23	0	0	13170000	530000	0	155000	13855000
	% Distribution	0	0	0	95	4	0	1	100

Select Photographs from the field

Plate 1. Research team in Yamunanagar

Plate 2. Poplar Plantation in Yamunanagar

Plate 3. Research Team in Kurukshetra

Plate 4. Poplar Plantation in Kurukshetra

Plate 5. Maize demonstration in Kurukshetra

Plate 6. Farm Implement in Kurukshetra

Plate 7. Research team in Kaithal

Plate 8. UGPL in Fathehabad

Plate 9. Cotton Plantation in Fathehabad

Plate 10. Dhaincha cropping in Fathehabad

Plate 11. *Neelgai* venturing into agricultural fields during daylight in Fathehabad

Plate 12. Field investigation in Fatehabad

Plate 13. A progressive farmer from Fathehabad with his awards

Plate 14. Farm Implement in Sirsa (Rotavator)

Plate 15. Research team in Sirsa

Plate 16. One-to-one filed investigation in Sonipat