CHAPTER – I

INTRODUCTION

1.1 Introduction

Agriculture has been a way of life and continues to be single most important livelihood of the masses. Agricultural policy focus in India across decades has been on self-sufficiency and self reliance in food grains production. Considerable progress has been made on food grains production that rose from 52 million tons in 1951-52 to 264.77 million tones in 2013-14. Its contribution to the national GDP has declined to 14.20 per cent due to high growth in industries and services sectors. Compared to other countries, India faces a greater challenge, since with only 2.30 per cent share in world's total land area; it has to ensure food security of its population which is about 17.50 per cent of world population. This leads to excessive pressure on land. Against the backdrop of the burgeoning population's demands for food grains, degrading natural resource base, emerging concerns of climate change and other challenges, the Department of Agriculture & Co-operation (DAC) has focused on mobilizing higher investment in agriculture for providing adequate support services to the farmers to make agriculture a remunerative vocation on a sustainable basis. Increasing agricultural production with limited natural resources in a sustainable manner for ensuring food and nutritional security and providing income security to farmers are the major challenges before the Government. Agriculture sector has touched a growth rate of 4.40 per cent in the second quarter of 2010-11 thereby achieving an overall growth rate of 3.80 per cent during the 1st half of 2010-11.

The agriculture sector of India records a GDP growth of 5.10 per cent in 2005-06, 4.20 per cent in 2006-07, 5.80 per cent in 2007-08, (-) 0.1 per cent in 2008-09 at 2004-05 prices. The low growth rate of 0.4 per cent recorded by this sector in 2009-10 was mainly due to poor rainfall in 2009. As per the estimation of central statistical organization for the year 2010-11, the agricultural sector contributed about 14.20 per cent to the GDP, at 2004-05 prices. There has been a continuous decline in the share of agriculture in the GDP from 17.40 per cent in 2006-07 to 14.20 per cent in 2010-11 as per advance estimates at 2004-05 prices. Falling share of agriculture in GDP is an expected outcome in a fast growing and changing economy.

As per the data given by the Ministry of Agriculture, Government of India total food grain production in India was 264.77 million tones (MTs) in 2013-14. The second advance estimates of food grains production has been given at 257.07 MTs for the year 2014-15. It comprised 106.54 MTs of rice, 95.91 MTs of wheat, 5.39 MTs of Jowar, 9.38 MTs of Bajra and 24.35 MTs of Maize (meant for the year 2013-14). Among pulse crops production figures of tur, gram, urad, moong and total pulses were 3.29 MTs, 9.88 MTs, 1.51 MTs, 1.50 MTs and 19.27 MTs respectively in the year 2013-14. As per 2nd advance estimates for the year 2014-15, a decline of 7.70 MTs (i.e., 2.91%) could be seen in regard to total food grains production. It was estimated at 257.07 MTs in 2014-15. *(Pratiyogita Darpan, Revised & Enlarged Edition, Indian Economy, 2015, p. 128).*

There has been an increase in input consumption of seeds, integrated Nutrient Management (INM), IPM and machinery components under rice, wheat, and pulses from 2007-08 to 2009-10 which indicates the awareness generated at the district level towards use of quality seeds, nutrients plant protection chemical and farm machinery. During 2008-09, nearly 50 per cent of the rice districts (70 out of 143), 33 per cent of the wheat districts (41 out of 138) and nearly 50 per cent of pulses districts 74 (out of 159) have recorded more than 10-20 per cent enhancement in productivity compared to the base year of 2006-07 (Annual Report DoAC, MoA, GoI 2010-11, p. 34).

National food security mission is a crop development scheme of India that aims at restoring soil health and achieving additional production of 10, 8 and 2 million tons of rice, wheat and pulses, respectively, (Government of India, Ministry of Agriculture, Department of Agriculture & Co-operation). Thereby achieving, an additional production of 20 million tones of food grains by 2011-12 so as to meet the projected consumption requirement of food grains. The mission covers about 13 million hectares of wheat area, 20 million hectare of rice area and 98 per cent of pulses area. Mission also aims at restoring soil fertility, creating employment opportunities and enhancing farm level economy to restore the confidence of the farmers of the targeted districts. Mission promotes proven technology and knowledge inputs packaged to deliver end to end agriculture services to reach out to farmers in 476 districts of 17 states that blend technology promotion with responsive administration for the timely delivery of the agricultural services to bridge the yield gaps in the selected districts *(Annual Report, 2010-11, MoA, GoI).* The mission's basics strategy is to promote and extend improved technologies i.e., seed, micronutrients, soil amendment, integrated pest management, farm machinery and resource of farmers with effective monitoring and better management. The fund flow is closely monitored to ensure that interventions reach the target beneficiaries on time. The

strategy also includes ensuring timely and complete reach of the proven technology and associated knowledge inputs to the farmers; promoting collaboration among various institutions at the district, state and national level dealing with different aspects of agriculture and rural development; empowering local administration for district specific promotion of additional locally relevant interventions; and recognizing good performance against objective parameter set for delivery of inputs and outcomes reached.

1.1.1 Launching of National Food Security Mission

The Government of India launched National Food Security Mission (NFSM) in 2007-08 at the beginning of 11th Five Year Plan with target to escalate production of rice, wheat and pulses by 10, 8 and 2 million tones respectively by the end of 11th Five Year Plan. The mission adopted two fold strategies to bridge the demand supply gap. First strategy was to expand area and the second was to bridge the productivity gap between potential and existing yield of food crops. Expansion of area approach was confined to pulses and wheat and rice was mainly targeted for productivity enhancement.

The measures adopted to augment the productivity included (i) acceleration of quality seed production; (ii) emphasizing INM and IPM; (iii) promotion of new production technologies; (iv) supply of adequate and timely inputs; (v) popularizing improved farm implements; (vi) restoring soil fertility, and; (vii) introduction of pilot projects like community generator and blue bull. A total amount of Rs. 4,500 crores have been spent under NFSM during the 11th Five Year Plan (GoI, 2014).

With these strategy and goals, NFSM was implemented in 561 districts in 27 states in the country (GoI, 2013). Along with the NFSM, RKVY programme was also launched during the same time period. In addition, there were several other state and Centrally Sponsored Programmes running parallel with the NFSM programme. Aided by all the above efforts of the Central and State governments, rice production by the end of 11th Five Year Plan increased by 12.1 million tones, wheat production by 19.1 million tones and pulses production by 3 million tones as compared to the production during the base year of 2006-07 (GoI, 2012). As per the progress report received from the states, significant achievements under NFSM have been recorded during last three years i.e., during 2007-08, 2008-09 and 2009-10. New farm practices have been encouraged through 3 lakhs demonstrations of improved package of practices. As many as 53,438 demonstrations of System of Rice Intensification (SRI) as well as 24,189 demonstration of hybrid rice have been conducted. Nearly, 85.79 lakh qtls of seeds of high yielding varieties of rice have been distributed. About 65.88 lakh hectares have been treated with soil ameliorants (gypsum/lime/micro-

nutrients) to restore soil fertility. An area of about 25.77 lakh hectares has been treated under integrated pest management.

1.1.2 Review of Literature

Government of India in its agricultural annual report 2010-11 stated that through new farm practices under NFSM nearly 50 per cent of the rice districts (70 out of 143), 33 per cent of the wheat districts (41 out of 138) and around 50 per cent of pulses districts (74 out of 159) have recorded more than 10 to 20 per cent per cent increases in productivity compared to the base year of 2006-07.

NABARD consultancy Services (NY) conducted a concurrent evaluation of NFSM by comparing NFSM and non-NFSM districts in Rajasthan considering current year and base year (2006-07). It was found from the study that there was an excellent growth in NFSM pulses districts with 57, 134 and 49 per cent growth in total sown area, production and productivity, respectively. In non-NFSM pulse districts, all three measures viz., area, production and productivity had decreased by 20, 101 and 68 per cent, respectively. Even though the non-NFSM districts have better irrigation sources than the NFSM districts, the yield in NFSM districts was generally higher.

Agricultural Finance Corporation Limited (AFCL), 2012 conducted mid-term evaluation of NFSM by selecting 17 states, 136 districts and 232 blocks common for all the 3 components i.e., rice, wheat and pulses. The study concluded that NFSM – Rice districts recorded yield gain of about two times and five times more than the non-NFSM districts during 2007-08 and 2008-09, respectively. The productivity of wheat in non-NFSM districts had better yield gain of 3.91 per cent in 2007-08 as compared to the 3 per cent increase in NFSM districts. The productivity of wheat in NFSM districts improved at 7.91 per cent and 12.87 per cent during 2008-09 and 2009-10, while the corresponding figures were 7.09 per cent and zero per cent in non-NFSM districts, respectively. In the year 2007-08, the non-NFSM pulse districts had recorded better yield by 1.14 per cent over the base year of 2006-07 compared to an increase of 0.99 per cent in NFSM districts. In the consecutive year 2008-09, NFSM districts showed improved performance by registering yield of 8.26 per cent as against the corresponding figure of 6.99 per cent in non-NFSM districts.

1.2 Background of NFSM in the State

The National Food Security Mission has been operating in 27 states of the country including Bihar. The National Food Security Mission comprising NFSM-rice, wheat and pulses during the 11th Five Year Plan. After successful achievement of targeted goal of production enhancement during 11th Five Year Plan, coarse cereals have been undertaken in 12th Five Year Plan under NFSM scheme and implemented in the

state. The crop wise, district covered under NFSM in Bihar during 11th and 12th Five Year Plans has been given in table 1.1 & 1.2 respectively.

Table No. 1.1: Crop wise, District wise coverage under NFSM in Bihar (11th Five Year Plan)

Crop	District Covered under NFSM
Rice	Araria, Banka, Champaran (East), Champaran (West), Darbhanga, Gaya, Katihar, Kishanganj, Madhubani, Madhepura, Muzaffarpur, Nalanda,, Saharsa, Samastipur, Siwan, Supaul, Jamui, Sitamarhi = 18
Wheat	Araria, Bhagalpur, Banka, Bhabua, Champaran (E) Champaran (W), Darbhanga, Jamui, Katihar,Khagaria, Kishanganj, Madhubani, Madhepura, Muzaffarpur, Nalanda, Purnea, Rohtas, Samastipur, Saran, Sitamarhi, Supaul, Vaishali, Munger, Nawada, Sheikhpura = 25
Pulse	Araria, Aurangabad, Bhojpur, Bhabhua, Madhubani Madhepura, Muzaffarpur, Nalanda, Patna, Purnea, Saharsa, Samastipur, Supaul = 13

Table No. 1.2: Crop wise, District wise coverage under NFSM in Bihar (12th Five Year Plan)

Crop	District Covered under NFSM
Rice	Araria, Champaran (E), Darbhanga, Gopalganj, Katihar, Kishanganj, Madhepura, Madhubani, Muzaffarpur, Purnea, Saharsa, Samastipur, Sitamarhi, Siwan, Supaul = 15
Wheat	Araria, Aurangabad, Bhojpur, Gaya, Gopalganj, Nalanda, Patna, Sitamarhi, Siwan, Supaul = 10
Pulse	Coverage All Bihar = 38 Districts.
Coarse Cereals	Begusarai, Bhagalpur, Champaran (E), Katihar, Khagaria, Madhepura, Purnea, Saharsa, Samastipur, Saran, Vaishali = 11

The National food security mission was launched in the state of Bihar in 2007-08 comprising NFSM-rice 18, wheat 25 and pulses 13 districts. Despite, there were some common districts in the state of Bihar comprising NFSM-rice and wheat in 15 common districts, NFSM-rice, wheat and pulses in 7 common district and NFSM-rice and pulses in 8 common districts are operating smooth fully.

1.3 Main Objectives and Scope of the Study

After completion of 11th Five Year Plan, National Food Security Mission is extended to 12th Five year Plan due to its successful achievement of the targeted goal of production enhancement. It is essential to evaluate and measure the extent to which the programme and approach has stood up to the expectation. The study would enlighten the policy makers to incorporate necessary corrective measures to make the programme more effective and successful during the 12th Five Year Plan. Given the above broad objectives, the study intends to achieve the following specific objectives listed below:

1. *To analyze the trends in area, production, productivity of rice, wheat and pulses in the selected NFSM and Non-NFSM districts in Bihar.*
2. *To analyze the socio-economic profile of NFSM vis-à-vis Non-NFSM beneficiary farmers of rice in Bihar.*
3. *To assess the impact of NFSM on input use, production and income among the beneficiary farmers in Bihar*

4. *To identify factors influencing the adoption of major interventions (improved technologies) under NFSM in the state of Bihar.*
5. *To identify the constraints hindering the performance of the programme in Bihar.*

1.4 Data and Methodology

The study is mainly based on the primary and secondary data. The secondary level data mainly confined to area, production and productivity of the crops were collected from various publications of Ministry of Agriculture (Government of India) and of the Directorate of Agriculture, (Government of Bihar), related websites, research reports, papers and presentations.

The primary survey data were collected from selected sample farmers from two NFSM rice district of the state as presented in table 1.3. For the selection of farmers, a multi-stage sampling design was used and shown in (Fig. 1.1). At the first stage, two NFSM rice districts were selected. For the selection of district, crop production triennium average (TE) in the NFSM districts for the last three years period for which latest data were available and managed in descending order. Among the NFSM districts, the district having highest production and district having lowest production were selected for survey for selected crop. Accordingly, West Champaran and Madhepura districts were selected for primary data collection.

Table No. 1.3: Sample NFSM Rice Districts of Bihar

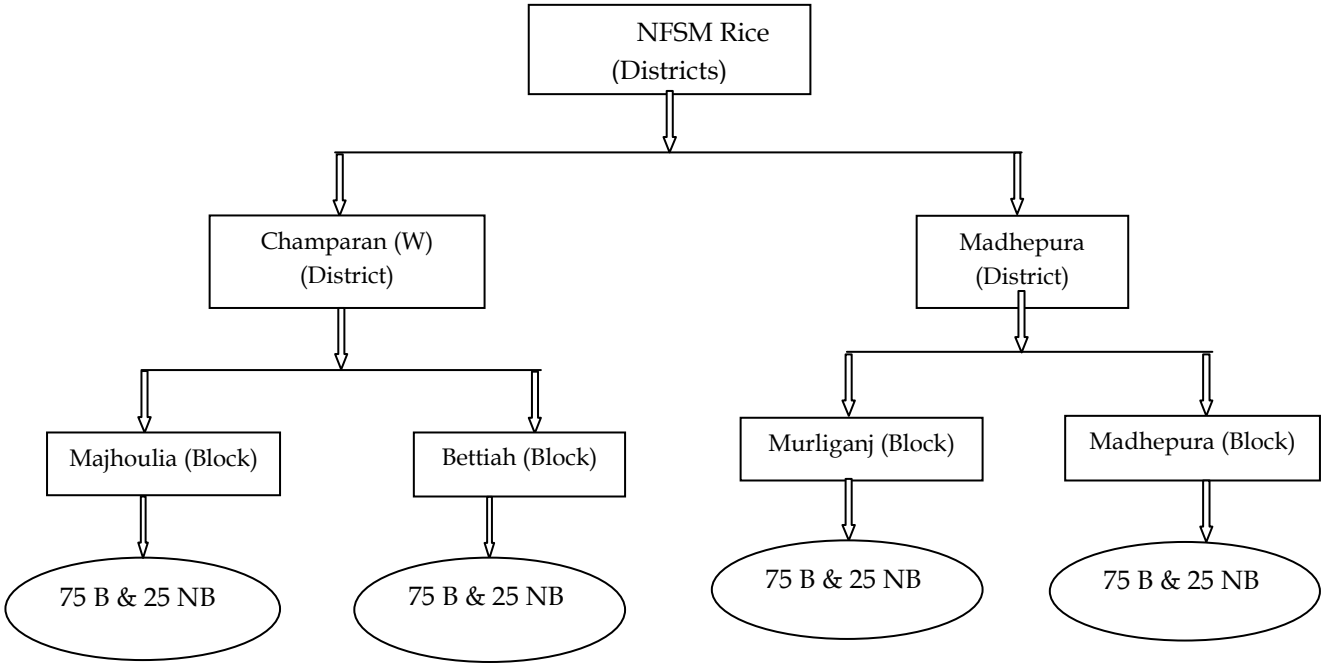
SN	Districts and Block		Selected Sample		
			Beneficiary	Non-Beneficiary	Total
1.	**West Champaran**		150	50	200
	i.	Majhoulia	75	25	100
	ii.	Bettiah	75	25	100
2.	**Madhepura**		150	50	200
	i.	Murliganj	75	25	100
	ii.	Madhepura	75	25	100
		Total	**300**	**100**	**400**

From each selected district, two blocks were selected at the 2nd stage, drawing one block from nearest district headquarter and 2nd at a distance of 15-20 km from the district headquarter. Accordingly, majhoulia and Bettiah block from west champaran; madhepura and murliganj block from madhepura district were selected.

Subsequently, at the third stage, 75 beneficiaries and 25 non-beneficiaries were selected randomly from each sample block making a total sample size of 200 households per district and 400 households for rice crop in the state of Bihar. For the selection of beneficiary households from each block, the beneficiary list was obtained from district Agriculture office at block level. After obtaining the beneficiary list, the households were selected in such a way. That major components/covered under the

scheme get due representation. For the selection of non-beneficiary households, there was no list available. Therefore, the selection of non-beneficiary households was done from same peripheral area so that similar cropping pattern and baseline characteristic are represented by the non-beneficiary households as well. Giving representation to different size classes and various socio-economic characteristics was also tried with the beneficiary and non-beneficiary sample farmers.

Figure 1.1: Multistage Sampling Method



Note: B= Beneficiaries, NB = Non-beneficiaries

For fulfilling the first objective of the study analyzing the trends in production, productivity of rice, wheat and pulses in NFSM districts and Non-NFSM districts, secondary data on area, production and productivity of rice, wheat and pulses for 9th, 10th and 11th Five Year Plan is used. Average annual growth rate, correlation and graphical analysis were applied for this secondary information. For meeting the remaining objectives, primary household data were used. The primary data relating to general information about the sample farmers, socio-economic profiles, cropping pattern, details on various inputs used in rice crop cultivation, irrigation details, yields, returns, reasons for adoption/non-adoption of NFSM interventions, constrains faced for availing the benefits, suggestions for improvement, etc. were collected from the sample beneficiary and non-beneficiary farmers using a pre-tested questionnaire. The primary household data was collected (during July-October, 2014) mainly pertaining to agriculture year 2013-14.

Data Analysis

The year to year change in irrigated area, fertilizer use as well as growth in area, production and productivity of crops covered under NFSM during 11th Five Year Plan was calculated as given below:

Year to year change (YYC) = (CYV-PYV)/PYV x 100

Where, CYV = Current Year Value;

PYV = Previous Year Value

The data of the last year of previous plan was used for estimation of year to year change for the 1st year of the plan. The plan wise average annual growth rate (AAGR) was calculated by taking average of year to year change, as given below:

Where, AAGR indicate average of year to year change. The relation between percentage change in NFSM expenditure and percentage change in fertilizer consumption, irrigated area and production of paddy, wheat and pulses was analyzed by estimating correlation coefficient between two data sets. In order to know the factors influencing the participation of farmers in NFSM logistic regression using generalized linear model was used. The binary dependent variable was used as 1 for NFSM beneficiaries; O for non-beneficiary. The independent variables used for analysis were age, (year), education (code), total farming income (Rs/annum), caste (code), total number of people engaged in farming, net irrigated area (acre), asset value (Rs.), and credit amount borrowed (Rs/acre).

1.5 Structure of the Report

The present report is organized in six chapters. The first chapter discusses the background, review of literature, rationale, objectives of the study and methodology used for data collection and data analysis. The coverage, sampling design and conceptual framework of the study have been discussed in this chapter.

The second chapter discusses the input use in the state and trend analysis in area, production and productivity of wheat, paddy and pulses. The financial progress under NFSM in the 11th & 12th plan period also been discussed in this chapter. The socio-economic profile of sample households/farmers, main features of the sample households including land ownership pattern, cropping pattern, sources of irrigation, area under HYV and value of output, farm assets holdings and the details of agricultural credit availed have been analyzed in Chapter III. Fourth chapter discusses the NFSM interventions and its impact on farming.

The next chapter (i.e., chapter – V) examines the factors influencing the participation of farmers in NFSM, constraints faced in availing the NFSM benefits and reasons for non participation in NFSM. The suggestions for the inclusion of non-beneficiary for availing benefits under NFSM have been presented in this chapter. The last chapter presents the summary, concluding observations and policy implications of the study.

CHAPTER – II

IMPACT OF NATIONAL FOOD SECURITY MISSION (NFSM) ON FOOD GRAINS PRODUCTION IN BIHAR --- *A Time Series Analysis*

2.1 Introduction

The growth of Bihar's economy has been strong and sustained one, and its growth rate was one of the highest among all the Indian states. During 2005-06 to 2009-10, the GSDP at constant prices grew at an annual rate of 10.20 per cent while, that was slightly higher at 10.40 per cent during 2010-11 and 2013-14. The GSDP of Bihar in 2004-05 was Rs. 0.78 lakh crore at current prices, yield per capita income of Rs. 8773 *(Economic Survey, Government of Bihar, 2014-15).*

The momentum of growth in Bihar's economy has got to be sustained for many more years in order to narrow the gap between the per capita income of Bihar and India. In 2009-10, the per capita income of Bihar was (Rs. 10,635 which increased to Rs. 15,650 in 2013-14 indicating an increase of 39.20 per cent).

The share of primary sector in GSDP has been declined over the year. It came down from 27 per cent in 2005-10 to 22 per cent during 2010-14. Since the secondary and tertiary sectors has been recorded a tremendous growth rate in the last decade, their shares in GSDP have increased steadily. Thus, the relative share for different sectors for the period 2010-14 stand as primary 22 per cent, secondary 19.20 per cent and tertiary 58.80 per cent.

Agricultural economy of Bihar is very much tilted in favour of the subsistence sector, since the acreage under food grains, even after a decrease in recent years, is more than 90 per cent of the total area under cultivation in year 2013-14. Out of this 95 per cent, the share of cereals is around of 85 per cent. Because of the use of new 'SRI' technique and newer agricultural implements, there was enormous rise in rice production. Similarly, the production levels of wheat and maize have also recorded a positive trend. Bihar presently produced 66.50 lakh tones of rice, 61.30 lakh tones of wheat, 5.20 lakh tones of pulses, 1.60 lakh tones of oilseeds and 128.80 lakh tones of sugarcane. The total cereals production is estimated at 157.16 lakh tones, for a population of about 109 million in 2013-14. *(Economic Survey, Government of Bihar, 2014-15).*

Since the inception of Green Revolution in India, the use of fertilizer in agriculture has played a vital role in increasing productivity. In 2009-10, the consumption of fertilizers in Bihar was 25.99 lakh tones, which rose to 31.15 lakh tones in 2012-13, registering an increase of 19.80 per cent in three year. In 2013-14, it has come down to 26.01 lakh tones. This decrease is not really worrisome, as the farmers are now keener to replace chemical fertilizers with the bio-fertilizers *(Economic Survey, Government of Bihar).*

The average annual rainfall in Bihar is 1013 mm. However, there is wide variation across the districts in terms of annual rainfall. During the period 2001-2013, the annual rain fall has varied from being 1506 mm. In 2013, the rainfall in 18 out of 38 districts exceeded the average rainfall. The net sown area was 57 per cent (53.35 lakh ha) of total geographical area (93.60 lakh ha) in 2009-10 and it increased marginally to 57.60 per cent in 2011-12 and water area constitutes about 3.90 per cent (3.65 lakh ha) of geographical area. Similarly, cropping intensity has also marginally increased from 137.00 per cent in 2009-10 to 142.00 per cent in 2011-12. The net sown area accounts for a higher share of total geographical area in agricultural prosperous districts as Bhojpur (77.60%), Buxar (82.70%), Siwan (76.40%), Madhepura (72.50%) and Gopalganj (72.60%).

The trend in area and fertilizers use in Bihar during 1997-98 to 2011-12 is presented in table 2.1. The exercise of this table reveals that during the period of last three plans (9th to 11th period), net area sown has marginally grown from 73.21 lakh ha in 1997-98 to 73.25 lakh ha in 1999-2000, but due to bifurcation of Bihar from Jharkhand in 2000-01, it was marginally slackened to 56.63 lakh ha. Moreover, net sown area has marginally fallen down from 56.64 lakh ha in 2001-02 to 53.91 lakh ha in 2011-12. Comparatively, the gross cropped area (GCA) in the state has decreased from 98.33 lakh ha in 1997-98 to 78.97 lakh ha in 2001-02 due to bifurcation of Bihar from Jharkhand in 2000-01. In this way, during the 9th Five Year Plan, a decline of 4.96 per cent could be seen in the GCA. In comparison to 9th Plan period, average declines in GCA were quite lower in the 10th & 11th Five Year Plans (0.69% & 0.30%) respectively. Out of 53.91 lakh hectares of net sown area, 35.70 lakh ha area was irrigated land in 2011-12. So, 66.22 per cent of net sown area in Bihar was irrigated. The percentage of gross irrigated area to gross cropped area in the state of Bihar was estimated to be 66.17 per cent. The cropping intensity in the state has increased by 0.92 per cent marginally during 9th Five Year Plan, but it has decreased to (0.01%) during 10th Plan, while it increased (0.57%) during 11th plan. Thereafter, the irrigation intensity has increased significantly (6.87%) during 9th plan, but it has decreased during 10th & 11th plan. The consumption of fertilizer per hectare NSA had increased tremendously by 11.32 per cent per annum during the 10th Plan, while

during 9th FYP period, the consumption of fertilizer had increased from 86.50 kg/ha of NSA in 1997-98 to 94.20 kg/ha of NSA in 2001-02 and the average annual growth rate for the period of 9th plan was 2.31 per cent. The average annual growth for the period of 11th plan was only 0.69 per cent which may due to adoption of organic farming and application of balance doses of the fertilizers in the state. It is important to note that despite the Government of India programme on 'Soil health card' (targeted to make aware the farmers' about the negative consequences of overdose of fertilizer application and positive effects of balanced fertilizer application on soil health), the fertilizer consumption in the state has shown increasing trend. However, there are large variations in use of fertilizer across the districts in the state of Bihar.

Table 2.1: Trend in Area and Fertilizer Use - BIHAR

Year	Net irrigated Area (lakh ha)	Gross irrigated Area (lakh ha)	Net sown area (lakh ha)	% net irrigated to net sown area	Irrigation intensity (%)	Cropping intensity (%)	Fertilizer consumption (Kg/ha of NSA)	Gross Cropped Area (In lakh ha)
1	2	3	4	5	6	7	8	9
1997-98	36.80	45.81	73.21	50.27	124.48	135.54	86.50	99.22
1998-99	36.81	45.81	73.24	50.26	124.45	134.25	88.55	98.33
1999-00	36.82	45.81	73.25	50.27	124.42	134.23	98.10	98.32
2000-01	28.21	44.57	56.63	49.81	157.99	141.14	99.65	79.93
2001-02	28.14	44.70	56.64	49.68	158.85	139.42	94.20	78.97
9th Plan Avg. AGR*	**- 5. 894**	**-0.603**	**- 5.654**	**- 0.294**	**6.869**	**0.924**	**2.316**	**-4.96**
2002-03	29.85	45.83	57.26	52.13	153.53	138.99	96.10	79.59
2003-04	31.66	48.86	57.12	55.43	154.33	137.99	87.50	78.82
2004-05	32.40	47.68	55.72	58.14	147.16	132.78	115.45	73.99
2005-06	31.70	48.30	55.56	57.05	152.37	133.13	120.15	73.97
2006-07	32.42	49.26	55.65	58.26	149.94	138.70	142.06	77.19
10th Plan Avg. AGR	**2.127**	**1.871**	**- 0.705**	**2.866**	**- 0.216**	**- 0.011**	**11.325**	**-0.69**
2007-08	32.24	49.04	55.98	57.59	152.11	138.71	156.12	77.65
2008-09	32.54	49.20	55.54	58.59	151.20	138.11	170.76	76.71
2009-10	32.39	44.41	53.32	66.99	137.11	136.83	181.10	72.96
2010-11	35.71	46.35	52.49	67.90	129.79	136.79	183.38	71.80
2011-12	35.70	48.28	53.91	66.22	135.24	141.84	157.89	76.47
11th Plan Avg. AGR	**2.672**	**- 0.219**	**- 0.908**	**3.739**	**- 2.764**	**0.575**	**0.697**	**-0.30**

Source: *Directorate of Economics and Statistics, GoB, Economic Survey, GoB, 2012-13 & 2014-15.*
Note*: Year on year growth rate (Annual Growth Rate) = (Current year value - Previous year value) / Previous year value*100*

2.2 Area, Production and Yield of Paddy, Wheat and Pulses Crops in the State

The fertility of soil and the abundant ground water resources enable the farmers of Bihar to produce a variety of crops. Apart from major cereals and pulses, farmers of Bihar also produce oilseeds, fiber and vegetables. The farmers have also taken

interest in growing flowers in view of its interesting demand, both domestic and external. The total cereal production in 2013-14 was 157 lakh tones as compared to 96.16 lakh tones in 2009-10. This quantum jump in production is primilarly due to huge rise in rice production in 2013-14 as compared to 2009-10. Because of the use of new 'SRI' technique and newer agricultural implements, there was enormous rise in rice production. The level of rice production, prior to 2010-11, was not consistent, with a wide year wise variation in the production levels. This is the fact that around 50 per cent area under rice was bereft of irrigation, and dependent on uncertain rainfall. The average annual wheat production was around 40-50 lakh tones during the period 2007-08 to 2010-11; thereafter, the production of wheat rose to 65.31 lakh tones in 2011-12. This is due to the introduction of 'zero tillage method' and use of 'SRI' technique. In 2013-14, however, the production level of wheat came down marginally to 61.35 lakh tones. The annual growth rate of wheat production was 8.90 per cent during the period 2009-10 to 2013-14. The production level of pulses increased from 4.60 lakh tones in 2009-10 to 5.22 lakh tones in 2013-14, implying a modest annual growth rate of 4.1 per cent. Taking into account the overall food grain situation, it is observed that during the last 5 years, the production level of cereals has grown annually at 16.10 per cent and that of pulses at 4.10 per cent, improving the food security of the state's population.

The comparative productivity levels have been shown by using two triennium averages, viz., 2005-08 and 2011-14. The average productivities of three important cereals in Bihar for the triennium 2011-14 are 2,365 kg/ha for rice, 2,900 kg/ha for wheat and 3,870 kg/ha for maize. For rice, there was 84.20 per cent change in productivity between the two trienniums; for wheat and maize, the changes, i.e., increases in productivities were to the tune of 51.10 per cent and 51.80 per cent respectively.

2.3 Growth of Paddy, Wheat and Pulses Crops in the State--- Impact of NFSM

Paddy and Wheat

The trend in area, production and productivity of paddy during last three plan period is presented in table 2.2. The table reveals that during 9th plan period, area under rice had tremendously declined at the annual average rate of growth of 6.75 per cent per annum whereas productivity growth was positive. The tremendously growth in production was recorded 9.72 and 34.61 per cent per annual in 10th and 11th FYP period respectively due to positive growth in productivity of this crop whereas, area under rice in both plan 10th & 11th period had declined lower than 9th FYP plan (6.75 % annual). During 9th FYP period, the rate of growth in area under wheat was found positive at the rate of 1.44 per cent per annum, whereas tremendous growth in productivity level was estimated (1.36 % per annum). During 10th FYP period, significant increase in productivity level (3.60 % per annum) has

resulted in significant growth in production (3.38%), but area has declined at the rate of 0.59 per cent per annum. The positive rate of growth in productivity positively contributed in significant increase in production of wheat in the State of Bihar (0.55 % per annum) during 11th FYP period. Nearly 163 per cent increase in paddy production could be seen in the year 2011-12 as compared to 2010-11. Some of the reasons for such a big jump in production may be traced as significant increase in productivity (125.69%) followed by use of new SRI technique and use of newer agricultural implements (Economic Survey, 2014-15, Government of Bihar).

Table 2.2: Trend in Area, Production and Yield of Paddy and Wheat - BIHAR

Year	Paddy			Wheat		
	Area (lakh ha)	Production (Tonnes)	Productivity (Qtls/ha)	Area (lakh ha)	Production (Tonnes)	Productivity (Qtls/ha)
1997-98	47.87	75.01	15.70	20.08	39.40	19.60
1998-99	47.56	51.59	10.80	20.53	42.92	20.90
1999-00	46.71	59.96	12.80	20.81	45.84	22.00
2000-01	36.56	54.45	14.90	20.68	44.37	21.50
2001-02	35.52	52.03	14.60	21.26	43.91	20.60
9th Plan Avg. AGR	**- 6.752**	**-7.158**	**0.425**	**1.446**	**2.873**	**1.359**
2002-03	35.85	49.86	13.91	21.30	40.41	18.90
2003-04	33.78	53.14	14.85	20.76	36.89	17.70
2004-05	31.40	25.29	8.10	20.28	32.63	16.10
2005-06	32.51	37.09	11.41	20.02	28.21	14.00
2006-07	34.73	51.21	14.75	20.77	41.56	20.00
10th Plan Avg. AGR	**-0.613**	**9.724**	**7.859**	**- 0.595**	**3.379**	**3.604**
2007-08	34.72	44.78	12.87	21.61	50.50	23.40
2008-09	34.95	55.78	10.47	21.34	44.85	21.00
2009-10	32.12	36.26	11.28	22.02	45.64	20.70
2010-11	28.45	31.12	10.90	22.01	45.62	20.70
2011-12	33.23	81.87	24.60	21.00	50.94	24.20
11th Plan Avg. AGR	**-0.514**	**34.618**	**27.851**	**- 0.674**	**0.547**	**1.305**

Source: Directorate of Economics and Statistics, Government of Bihar

Pulses

As like in paddy, area under pulses recorded negative trend during 9th FYP period, while productivity growth was positive at the rate of 2.77 per cent per annum which increased the production at the rate of less than 1.00 per cent per annum during this period. The decline in production level (5.02 % per annum) due to decreased in area (3.10 % per annum) and in productivity (2.02 % per annum) during 10th FYP period has recorded. During 11th FYP period, production of pulses had increased at the rate of 2.36 per cent per annum due to significant increased in productivity level at the

rate of 5.31 per cent per annum while; area under pulses had declined at the rate of 2.69 per cent per annum (table 2.3).

Table 2.3: Trend in Area, Production and Yield of Pulses (BIHAR)

Year	Pulses		
	Area (lakh ha)	Production (Tonnes)	Yield (Qtls/ha)
1997-98	7.52	5.48	7.30
1998-99	7.35	6.69	9.10
1999-00	7.12	6.20	8.70
2000-01	7.19	6.22	8.70
2001-02	6.97	5.49	7.90
9th Plan Avg. AGR	**-1.866**	**0.835**	**2.766**
2002-03	7.00	5.61	8.00
2003-04	6.84	5.59	8.20
2004-05	6.61	4.69	7.10
2005-06	5.70	4.16	7.30
2006-07	6.10	4.48	7.30
10th Plan Avg. AGR	**-3.099**	**-5.016**	**-2.024**
2007-08	5.85	4.76	8.10
2008-09	5.89	4.72	8.00
2009-10	5.58	4.64	8.30
2010-11	5.38	4.67	8.60
2011-12	5.24	5.20	9.90
11th Plan Avg. AGR	**-2.691**	**2.365**	**5.311**

Source: Directorate of Economics & Statistics, Government of Bihar, Economic Survey, 2014-15, Government of Bihar

2.4 District wise Growth of Paddy, Wheat and Pulse Crops and Impact of NFSM

The district wise growth in area, production and yield of rice in NFSM and Non-NFSM districts in Bihar is presented in table 2.4. The table reveals that during 11th FYP period, among NFSM districts, Samastipur district recorded highest rate of growth in production of paddy (131.06 %) followed by Nalanda (92.88 %) and Madhubani (73.52% %) and the lowest growth rate in production of paddy was recorded in Siwan (-20.00%). After that, growth rate of area was highest in Samastipur followed by Sitamarhi and Madhubani districts while, the percentage growth rate of yield was also highest in Samastipur district followed by Nalanda and Gaya with 84.36 per cent and 63.43 per cent respectively.

Among non-NFSM districts, Khagaria district has recorded highest growth in production (135.68%), during 11th Plan mainly due to increased area under this crop whereas, lowest growth rate was estimated in Patna district and productivity growth rate was found better than area and production growth rate.

Table 2.4: Average AGR in Area, Production and Yield of Paddy in NFSM and Non-NFSM districts in Bihar.

Districts	9th FYP			10th FYP			11th FYP		
	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)
NFSM Districts									
Araria	NA	NA	NA	1.07	-12.04	-13.25	2.27	35.72	31.17
Banka	NA	NA	NA	-15.33	-15.64	-3.60	-8.18	50.80	51.79
Champaran (E)	NA	NA	NA	2.09	-20.72	-21.47	2.03	-6.00	-9.33
Champaran (W)	NA	NA	NA	-10.71	-34.84	-26.80	-2.68	8.09	8.88
Darbhanga	NA	NA	NA	-5.72	-15.69	-10.31	-4.50	10.34	26.88
Gaya	NA	NA	NA	-15.89	-27.81	-29.96	-17.87	18.27	63.43
Katihar	NA	NA	NA	-4.44	-24.22	-20.26	-5.74	12.60	29.22
Kishanganj	NA	NA	NA	-3.87	-27.95	-12.03	-10.78	1.48	16.67
Madhubani	NA	NA	NA	2.18	39.22	38.06	6.61	73.52	63.13
Madhepura	NA	NA	NA	-9.61	-8.13	0.15	5.49	-5.36	-10.68
Muzaffarpur	NA	NA	NA	10.54	-30.49	-37.34	-2.21	16.24	20.80
Nalanda	NA	NA	NA	-13.43	-51.80	-44.44	-3.17	92.88	84.36
Saharsa	NA	NA	NA	-8.15	-3.58	1.48	3.81	43.28	42.91
Samastipur	NA	NA	NA	-11.14	-52.79	-48.22	16.14	131.06	86.77
Sitamarhi	NA	NA	NA	-12.96	-33.28	-27.40	9.97	24.67	23.76
Siwan	NA	NA	NA	5.49	-16.89	-21.16	-3.73	-1.04	2.67
Supaul	NA	NA	NA	3.55	11.31	6.94	-18.28	-20.00	-2.95
Jamui	NA	NA	NA	23.43	15.06	-10.70	-11.80	17.50	30.53
Sub total	NA	NA	NA	-4.43	-23.99	-20.23	-2.69	21.38	28.07
Non-NFSM Districts									
Patna	NA	NA	NA	-13.48	-29.32	-21.01	-28.56	-37.12	-7.47
Bhojpur	NA	NA	NA	-6.41	-21.84	-15.85	5.13	34.03	26.37
Buxar	NA	NA	NA	-17.04	-31.51	-20.41	-0.51	16.16	17.45
Rohtas	NA	NA	NA	-10.12	10.09	23.24	07.00	-4.30	2.76
Bhabhua	NA	NA	NA	4.95	6.56	1.06	3.15	-1.13	-7.06
Jehanabad	NA	NA	NA	-17.80	-29.44	-16.81	-47.26	-15.40	45.13
Nawada	NA	NA	NA	45.12	-27.30	-17.56	-0.94	34.34	50.67
Aurangabad	NA	NA	NA	-5.38	-13.20	-12.31	1.93	16.69	14.84
Saran	NA	NA	NA	-7.24	-13.03	-5.75	-7.73	2.81	10.78
Gopalganj	NA	NA	NA	-8.07	-25.41	-18.45	-1.06	2.87	3.31
Sheohar	NA	NA	NA	1.88	-44.16	-44.99	5.32	51.53	33.85
Vaishali	NA	NA	NA	3.70	-27.72	-29.86	-16.90	14.83	38.52
Begusarai	NA	NA	NA	12.83	-16.02	-27.50	6.05	11.61	9.92
Munger	NA	NA	NA	12.00	-8.86	2.78	14.03	6.48	-7.36
Sheikhpura	NA	NA	NA	1.36	-19.45	-27.61	-9.25	33.13	37.04
Lakhisarai	NA	NA	NA	-1.94	34.21	8.83	-10.56	6.78	10.63
Khagaria	NA	NA	NA	-34.99	-40.37	-1.09	45.16	135.68	46.78
Bhagalpur	NA	NA	NA	16.49	-5.55	-15.88	-33.41	-4.73	48.18
Purnea	NA	NA	NA	-0.82	-8.84	-8.83	-19.96	2.06	24.63
Arwal	NA	NA	NA	---	---	---	---	---	---
Sub total	NA	NA	NA	5.74	-13.38	-12.26	-17.60	7.95	16.87
Grand total	NA	NA	NA	-90.02	-18.75	-15.70	-8.94	14.37	21.44

The growth in area, production and yield of wheat in NFSM and Non-NFSM districts in Bihar is shown in table 2.5 reveals that during 11th Five Year Plan period, the growth rate of production was recorded highest in Madhubani district (120.38%) followed by Araria (90.07%) and Banka (72.31%), mainly due to positive and significant growth in area and yield of wheat crops under NFSM districts. Out of two sample districts, West Champaran had positive growth in production (41.26%) whereas Madhepura had recorded negative growth in production per annum, mainly due to declined in growth of area (17.12%).

Among Non-NFSM districts, Sheohar, Buxar and Bhojpur had recorded more than 50.00 per cent increase in production during 11th FYP period along with about 30.00 per cent growth was recorded in production of grand total during 11th FYP period.

Table 2.5: Average AGR in Area, Production and Yield of Wheat in NFSM and Non-NFSM districts in Bihar

Districts	9th FYP			10th FYP			11th FYP		
	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)
NFSM Districts									
Araria	NA	NA	NA	11.42	-46.58	-52.45	-1.28	90.07	96.31
Bhagalpur	NA	NA	NA	9.47	-17.06	-23.57	-12.18	38.15	55.22
Banka	NA	NA	NA	-16.77	-13.83	1.68	12.39	72.31	52.27
Bhabhua	NA	NA	NA	-4.08	-17.80	-13.85	4.22	6.22	1.40
Champaran (E)	NA	NA	NA	-15.84	-33.94	-21.63	-11.31	15.54	3.92
Champaran (W)	NA	NA	NA	2.15	-30.50	-29.10	0.21	41.26	41.21
Darbhanga	NA	NA	NA	13.58	7.36	-5.51	10.61	65.52	50.50
Jamui	NA	NA	NA	- 27.48	-30.14	-4.33	-16.80	1.14	23.09
Katihar	NA	NA	NA	-2.99	-43.23	-40.85	-15.36	50.99	79.88
Khagaria	NA	NA	NA	5.30	-10.04	-14.99	-11.72	29.58	46.95
Kishanganj	NA	NA	NA	19.77	-20.31	-35.28	-18.57	-19.66	0.43
Madhubani	NA	NA	NA	27.67	-18.46	-35.82	11.90	120.38	95.09
Madhepura	NA	NA	NA	-8.53	-35.53	-30.04	-17.12	-29.85	43.93
Muzaffarpur	NA	NA	NA	2.10	-22.36	-23.82	12.74	45.00	-82.82
Nalanda	NA	NA	NA	-1.66	-30.98	-29.87	-12.37	-1.19	12.03
Purnea	NA	NA	NA	-4-98	-35.40	-32.76	-15.64	32.62	57.65
Rohtas	NA	NA	NA	6.92	8.02	1.71	3.13	-1.24	12.53
Samastipur	NA	NA	NA	-2.14	-12.38	-10.30	13.78	65.28	44.67
Saran	NA	NA	NA	3.89	-7.92	-11.43	-1.60	18.62	21.10
Sitamarhi	NA	NA	NA	0.76	-4.68	-7.22	7.86	23.77	15.75
Supaul	NA	NA	NA	1.03	-8.66	-9.34	-11.82	8.01	22.65
Vaishali	NA	NA	NA	-0.45	-18.30	-19.35	9.53	64.22	53.03
Munger	NA	NA	NA	2.89	0.86	-1.64	-9.90	8.66	20.57
Nawada	NA	NA	NA	-4.41	-21.63	-19.04	18.16	49.28	28.78
Sheikhpura	NA	NA	NA	-6.27	-14.25	-9.02	15.89	38.66	20.38
Sub total	NA	NA	NA	0.82	-18.84	-19.58	-0.31	30.11	33.82

Non-NFSM Districts									
Patna	NA	NA	NA	-4.07	-17.77	-14.60	0.64	-1.09	-1.29
Bhojpur	NA	NA	NA	-7.45	-10.13	-3.84	13.65	51.15	33.51
Buxar	NA	NA	NA	- 4.71	-18.68	-13.57	44.43	78.44	20.37
Jehanabad	NA	NA	NA	-14.92	-11.74	3.53	-3.38	-6.71	-2.66
Gaya	NA	NA	NA	22.17	15.55	-8.49	-6.10	21.11	33.08
Arwal	NA	NA	NA	---	---	---	---	---	---
Aurangabad	NA	NA	NA	10.89	-4.55	-14.49	42.61	18.48	-11.20
Siwan	NA	NA	NA	-5.67	-17.09	-11.90	9.97	38.81	25.51
Gopalganj	NA	NA	NA	-1.49	-17.14	-16.05	-2.55	10.48	13.09
Sheohar	NA	NA	NA	6.36	-26.12	-26.86	3.26	86.38	74.26
Begusarai	NA	NA	NA	-9.01	-17.25	-8.94	6.67	-87.26	12.70
Lakhisarai	NA	NA	NA	4.44	24.47	15.39	34.36	27.43	-1.53
Saharsa	NA	NA	NA	-11.39	-32.41	-23.17	-4.89	20.89	27.70
Sub total	NA	NA	NA	-2.40	-13.37	-10.64	12.47	29.98	25.61
Grand total	NA	NA	NA	-0.21	-16.98	-16.47	3.70	30.06	3076

In case of pulses, an analysis of table 2.6 reveals that among all NFSM districts covered during the last five years plan period, Bhojpur, Bhabhua has recorded highest rate of growth in pulses production (64.15%), whereas lowest growth in production was recorded in Aurangabad (14.38%) and others shows negative in growth of pulses production. Out of all NFSM districts, Bhojpur shows highest growth in production of pulses with increased in area and productivity under these crops. Due to drastic declined in area and productivity of pulses, production of pulses in muzaffarpur district had declined drastically followed by Saharsa district of Bihar.

Table 2.6: Average AGR in Area, Production and Yield of Pulses in NFSM and Non-NFSM districts in Bihar

Districts	9th FYP			10th FYP			11th FYP		
	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)	Area (%)	Production (%)	Yield (%)
NFSM Districts									
Araria	NA	NA	NA	6.72	0.81	-5.45	-25.06	-10.03	19.84
Aurangabad	NA	NA	NA	-9.59	20.39	33.16	2.94	14.38	11.18
Bhojpur	NA	NA	NA	-19.88	-31.29	-14.29	12.26	64.15	46.27
Bhabhua	NA	NA	NA	-18.64	-23.23	-5.58	-11.16	-16.39	5.91
Madhubani	NA	NA	NA	2.91	-23.03	-20.74	-18.38	-10.86	9.36
Madhepura	NA	NA	NA	-24.39	-6.50	23.62	2.03	-14.32	-15.92
Muzaffarpur	NA	NA	NA	19.64	18.29	-1.20	-18.34	-29.76	-13.85
Nalanda	NA	NA	NA	-8.62	-12.55	-4.31	-9.62	17.62	30.21
Patna	NA	NA	NA	-18.02	-26.98	-10.98	-16.00	-7.13	10.65
Purnea	NA	NA	NA	-10.34	-13.66	-3.65	-41.70	-26.25	26.54
Saharsa	NA	NA	NA	-16.38	-19.56	-3.76	-24.93	-27.12	-2.93
Samastipur	NA	NA	NA	-17.17	-23.16	-7.20	-2.66	46.60	-12.82
Supaul	NA	NA	NA	-1.67	-14.06	-12.56	-11.37	-8.09	3.64
Sub total	NA	NA	NA	-10.31	-15.40	-4.38	-12.39	-0.63	13.60

Non-NFSM Districts									
Buxar	NA	NA	NA	-21.63	-5.94	20.19	-42.20	-39.26	5.12
Rohtas	NA	NA	NA	-14.77	-12.16	3.11	-26.95	-5.32	29.50
Gaya	NA	NA	NA	-5.40	-6.85	-1.59	-29.48	-10.43	27.01
Jehanabad	NA	NA	NA	-9.48	-15.75	-6.92	-27.74	-20.33	10.26
Arwal	NA	NA	NA	---	---	---	---	---	---
Nawada	NA	NA	NA	-17.35	-30.90	-16.49	96.57	47.08	33.29
Saran	NA	NA	NA	-15.38	-19.94	-5.38	-30.31	-35.03	-6.82
Siwan	NA	NA	NA	-30.34	-37.92	-10.84	-23.82	30.77	-9.63
Gopalganj	NA	NA	NA	-52.36	-34.29	37.92	5.39	-13.53	-17.94
Vaishali	NA	NA	NA	-13.98	-35.85	-25.43	-10.32	-8.85	1.66
Sitamarhi	NA	NA	NA	-6.73	-23.31	-17.83	3.08	32.71	28.87
Sheohar	NA	NA	NA	-6.27	-39.78	-35.79	9.03	59.65	46.41
Champaran (E)	NA	NA	NA	-20.38	-45.56	-31.67	1.15	41.07	39.50
Champaran (W)	NA	NA	NA	0.80	-22.27	-22.85	1.89	28.08	25.61
Darbhanga	NA	NA	NA	-32.25	-33.32	-1.47	-15.87	-10.47	4.46
Munger	NA	NA	NA	-39.28	-36.92	3.88	22.37	22.50	0.13
Begusarai	NA	NA	NA	-21.15	-22.08	-1.17	-4.74	16.43	22.20
Lakhisarai	NA	NA	NA	1.83	6.77	4.89	8.28	12.02	3.41
Sheikhpura	NA	NA	NA	36.36	32.74	-2.59	-18.67	26.57	55.49
Jamui	NA	NA	NA	-20.01	-17.38	3.31	-50.10	-38.32	23.59
Khagaria	NA	NA	NA	-6.35	-9.20	-2.98	-11.26	2.02	14.93
Bhagalpur	NA	NA	NA	-15.81	-20.67	-5.73	-4.95	8.70	14.32
Banka	NA	NA	NA	-5.57	-1.11	4.65	-28.95	-12.54	23.06
Kishanganj	NA	NA	NA	8.98	15.50	5.87	-0.19	7.56	7.80
Katihar	NA	NA	NA	1.29	-0.95	-2.24	-2.61	11.83	14.83
Sub total	NA	NA	NA	-12.38	-17.32	-4.42	-11.52	2.67	20.67
Grand total	NA	NA	NA	-11.24	-16.27	-4.41	-12.00	0.85	17.96

2.5 Financial Progress under NFSM in 11th & 12th FYP, classification of outlay and expenditure by districts and nature of interventions

The financial progress under NFSM programme in Bihar during 11th FYP was analyzed and presented in table 2.7 reveals that the amount released at initial stage of 11th FYP, 2007-08 was Rs. 3631 lakh which increased to Rs. 7487 lakh at the last stage of this plan accounting for 34.92 per cent average annual growth rate whereas, the total expenditure during the same span of 11th five year plan was increased from Rs. 1331 (2007-08) to Rs. 6314 (2011-12) accounting for 75.24 per cent per annum at the end of this plan. Thus, the average AGR at the end of 11th plan was estimated to 64.66 per cent which indicates a positive sign of expenditure during the 11th five year plan under the NFSM programme in the state of Bihar.

Table 2.7: Financial Progress under NFSM in Bihar

Year	Amount Released *(Rs. in lakhs)*	Achievement (Expenditure) *(Rs. in lakhs)*	Percentage of Achievement
2007-08	3631	1331	36.66
2008-09	8105	4282	52.83
2009-10	4414	8998	203.85
2010-11	5156	6570	127.42
2011-12	7487	6314	84.33
11th Plan Avg. AGR	**34.92**	**75.24**	**64.66**
2012-13	5303	5183	97.74
2013-14	1522	4328	284.36
2014-15	3419	2002	58.56
12th Plan Avg. AGR	26.66	-35.11	55.76

Source: Directorate of Economics & Statistics, Government of Bihar.

However, average AGR of amount released during 12 FYP was at the rate of 26.66 per cent per annum. While, that of amount expenditure during same plan was negatively significant at the rate of 35.11 per cent per annum. The main reason for negative expenditures is delay in release of funds and its consequential problems for timely utilizations.

2.6 Correlation between percentage change in NFSM expenditure and percentage change in seeds, fertilizer consumption, irrigated area, area and production of paddy, wheat and pulses.

The correlation between percentage change in NFSM expenditure and irrigation/fertilizer in Bihar during the period of 2006-07 to 2010-11 presented in table 2.8 reveals that due to 221.71 per cent change in NFSM expenditure, there was 0.93 per cent change in irrigated area and 9.38 per cent change in fertilizer consumption in the 2008-09. There was -0.46 and 6.06 per cent change in net irrigated area and fertilizer consumption respectively due to 110.14 per cent change in total NFSM expenditure during 2009-10 financial year. Due to -26.98 per cent change in NFSM expenditure during 2010-11 financial years, there were 10.25 and 1.26 per cent change in net irrigated area and consumption of fertilizers respectively. After that, during last financial year of 11th Five Year Plan, there was -0.03 per cent and -13.90 per cent change in net irrigated area and fertilizer consumption respectively due to -03.90 per cent change in total NFSM expenditure. Thus, on an overall, there was positive significant correlation of 0.72 between NFSM expenditure and fertilizer consumption whereas in case of net irrigated area, there was negative significant correlation between NFSM expenditure and net irrigated area.

Table 2.8: Correlation between Per Cent Change in NFSM Expenditure and Irrigation / Fertilizer in Bihar

Year	% Change Total NFSM Expenditure	% Change of Net Irrigated Area	% Change of Fertilizer
Change over 2006-07	---	---	---
Change over 2007-08	---	---	---
Change over 2008-09	221.71	0.93	9.38
Change over 2009-10	110.14	-0.46	6.06
Change over 2010-11	-26.98	10.25	1.26
Change over 2011-12	-3.90	-0.03	-13.90
Correlation Coefficient	---	-0.53	0.72

The correlation between NFSM expenditure and area and production of paddy in Bihar is presented in table 2.9 reveals that change in area was positively correlated with change in expenditure whereas change in production negatively correlated with expenditure. After that, table 2.10 reveals that change in area of wheat was positively correlated with change in expenditure while change in production of wheat was negatively correlated with change in NFSM expenditure.

Table 2.9: Correlation between NFSM Expenditure and Area and Production of Paddy in Bihar

Year	% Change Total NFSM Expenditure	% Change of Area Lakh Ha	% Change Production '000 Tonnes
Change over 2006-07	---	---	---
Change over 2007-08	---	---	---
Change over 2008-09	3261.76	0.66	24.56
Change over 2009-10	56.87	-8.10	-34.99
Change over 2010-11	-6.13	-11.43	-14.18
Change over 2011-12	-8.56	16.80	163.08
Correlation Coefficient	---	0.054	-0.086

Table 2.10: Correlation between NFSM Expenditure and Area and Production of Wheat in Bihar

Year	% Change Total NFSM Expenditure	% Change of Area Lakh Ha	% Change Production '000 Tonnes
Change over 2006-07	---	---	---
Change over 2007-08	---	---	---
Change over 2008-09	85.35	-1.25	-11.19
Change over 2009-10	127.51	3.19	1.76
Change over 2010-11	-40.32	-0.05	-0.04
Change over 2011-12	15.33	-4.59	11.66
Correlation Coefficient	---	0.52	-0.29

The correlation between NFSM expenditure and area and production of pulses in Bihar is presented in table 2.11. The table reveals that change in production as well as change in area under this crop was found highly correlated with NFSM expenditure but correlation between changes in production was highly correlated with NFSM expenditure as compared to change in area under this crops.

Table 2.11: Correlation between NFSM Expenditure and Area and Production of Pulses in Bihar

Year	% Change Total NFSM Expenditure	% Change of Area Lakh Ha	% Change Production '000 Tonnes
Change over 2006-07	---	---	---
Change over 2007-08	---	---	---
Change over 2008-09	881.71	0.68	-0.84
Change over 2009-10	162.24	-5.26	-1.69
Change over 2010-11	-43.53	-3.58	0.65
Change over 2011-12	-31.71	-2.60	11.35
Correlation Coefficient	---	0.79	0.112

2.7 Summary of this Chapter

- At the end of last three five years plan (9th to 11th Plan), net sown area in the state has declined from 73.21 lakh hectares in 1997-98 to 53.91 lakh hectares in 2011-12, whereas gross cropped area in the state has also declined from 98.33 lakh hectares in 1997-98 to 78.97 lakh hectares in 2001-02 may due to bifurcation of Bihar from Jharkhand in 2001-02.
- The per cent of gross irrigated area to gross cropped area in the state of Bihar was to be estimated at 66.17. The cropping intensity in the state has increased by 0.92 per cent marginally during 9th FYP, but it has decreased to 0.01 per cent during 10th Plan, while it increased 0.57 per cent during 11th FYP. Thereafter, the irrigation intensity has increased significantly 6.87 per cent during 9th Plan but it has decreased during 10th and 11th Plan.
- The consumption of fertilizer per hectare NSA had increased tremendously by 11.32 per cent per annum during the 10th Plan, while during 9th FYP period, the consumption of fertilizer had increased from 86.50 kg/ha of NSA in 1997-98 to 94.20 kg/ha of NSA in 2001-02 and the average annual growth rate for the period of 9th plan was 2.31 per cent. The average annual growth for the period of 11th plan was only 0.69 per cent which may due to adoption of organic farming and application of balance doses of the fertilizers in the state.
- The production of paddy and wheat have recorded significant growth during 10th as well as 11th FYP due to significant growth in productivity of paddy during that of same period, whereas production of paddy has recorded negative growth with declined in area under this crop during 9th FYP while, in case of pulses, production has recorded positively significant growth during 9th & 11th FYP due to increased in the productivity of same crop but that of same crop has recorded negatively significant per annum during 10th FYP due to declined in area and productivity under pulses crops.
- Average AGR at the end of 11th Plan was estimated to 64.66 per cent which indicates a positive sign of expenditure during 11th FYP under NFSM programme in the state of Bihar.
- Average AGR of amount released during 12 FYP was at the rate of 26.66 per cent per annum. While, that of amount expenditure during same plan was negatively significant at the rate of 35.11 per cent per annum. Despite

availability of released amount under NFSM in Bihar, there was a decline in expenditures during the years of 12th Five Year Plan. So, a negative expenditure scenario is of evident.

- On an overall, there was positive correlation (0.72%) between NFSM expenditure and fertilizer consumption while, in case of net irrigated area, negative correlation between NFSM expenditure and net irrigated area was seen.
- Percentage change in area of paddy and wheat was positively correlated with change in expenditure under NFSM but production of same crops showed negatively correlated with change in NFSM expenditure, whereas change in production as well as area of pulses was highly correlated with NFSM expenditure but correlation between change in production was highly correlated with NFSM expenditure as compared to change in area under this crops.

CHAPTER – III

HOUSEHOLD CHARACTERISTICS, CROPPING PATTERN AND PRODUCTION STRUCTURE

3.1 Socio-Economic Profile of Sample Households

The socio-economic profile of the selected household is shown in table 3.1. It may be seen from the table that the selected NFSM beneficiary households were relatively large in size, more dependence on agriculture with 1.52 times higher average size of holdings than selected non-NFSM households. The average family size of beneficiary households was 7.38 whereas same was 6.25 in case of non-beneficiary households. The average size of land holding with beneficiary and non-beneficiary was 4.34 acre and 2.84 acre respectively. It may also be seen from the table that both categories households were dominated by male respondents thus decision were mostly taken by male as head of households. It was noted here that only 66.58 per cent members of beneficiary households and about 62.45 per cent members of non-beneficiary households were engaged in agriculture, also agriculture was major source of income for both categories of households. About one-third of family members were aged below the 15 years with one fourth illiterate family members in both group. The social classification of selected beneficiary households indicate that the percentage of other backward classes was highest (54.68%) followed by general category households (33.02%) and lowest share was of SC category households (12.30%). Almost similar trend was found in case of non-beneficiaries. The percentages of OBC category of non-beneficiary respondents were (58.33) followed by general category (25%) and SC (16.68%).

The distribution of net operated area as per land holding size indicate that among the beneficiary group, marginal farmers accounted for 43.50 per cent of total holders with about 16.58 per cent of total net operated land area, followed by small farmers (34.25% holders with 34.32 per cent of total net operated land area), medium farmers (14.05 holder with 26.49% of net operated area) and the lower number of holders was recorded in case of larger farmers group (8.20% of holder accounted for 22.61 per cent of area). In case of non-beneficiary households, same trend was found. Thus, total 77.75 per cent beneficiary holders which were marginal and small farmers together had hold largely 50.90 per cent area of total land holdings, whereas in case of non-beneficiary households, total 83 per cent small and marginal holders held together 42 per cent share in total land holding area. The average net operated land

holding size was higher in beneficiary households (4.34 acre) than non-beneficiary (2.84 acre).

Table 3.1: Socio-Economic Profile of the Sample HH (% of Hh)

Characteristics			NFSM	Non-NFSM
Total households surveyed: numbers			300	100
Household size: numbers			7.38	6.25
% of HH members engaged in farming			66.58	62.45
Gender of the Respondent (%)		Male	74.55	78.68
		Female	25.45	21.32
Age group of the members (%)		Adult Males (>15 yrs)	37.71	35.06
		Adult Females (>15 yrs)	28.20	33.35
		Children (<15 yrs)	34.09	31.59
Education status of the family members (%)		Illiterate	24.30	38.43
		Primary	36.25	34.10
		Middle	14.15	12.35
		Matriculation/secondary	16.48	18.15
		Higher secondary	6.15	4.58
		Degree/Diploma	1.44	1.28
		Above Degree	1.23	1.11
Caste of households (%)		SC	12.30	16.67
		ST	---	---
		OBC	54.68	58.33
		General	33.02	25.00
Occupation income (Rs./annum/HH)		Only agriculture (Net)	98672.60	55210.25
		Own business	8740.72	9850.48
		Salaried/pensioners	---	2910.50
		Wage earners	9280.65	6218.30
		Others*	6528.10	6854.08
		Average annual income from all sources	123222.07	81043.61
Net operated area	% of area	Marginal (0.1 to 2.5 ac)	16.58	24.35
		Small (2.51 to 5 ac)	34.32	18.08
		Medium (5.1 to 10 ac)	26.49	32.92
		Large (10.1 and above)	22.61	24.65
	% of holdings	Marginal (0.1 to 2.5 ac)	43.50	68.50
		Small (2.51 to 5 ac)	34.25	14.50
		Medium (5.1 to 10 ac)	14.05	11.60
		Large (10.1 and above)	8.20	5.40
	Average size	Total (acres)	4.34	2.84

Source: Field Survey.

3.2 Characteristics of Operational Holdings

The characteristics of operational holdings of sample farmers are presented in table 3.2. An analysis of this table reveals that beneficiary household had their owned land 4.05 acre, whereas non-beneficiary had 2.62 acre land. The pattern of land leased in seems to be dominant in beneficiary household, whereas leased out pattern prevailed among the non-beneficiary households. It is also revealed that area sown more than once was higher in beneficiary household (2.04 acre) than non beneficiary household (1.23 acre), the share of gross cropped area to net sown area of beneficiary

household was (68.02%) and that of non-beneficiary household was (65.35%). Higher cropping intensity was found in case of non-beneficiary household (153.02%) than beneficiary household (147%). In terms of area irrigated more than once, higher irrigation intensity could be seen in beneficiary household (143.42%) than non-beneficiary household (141.66%).

Table 3.2: Characteristics of operational holdings of sample Hh (acres per Hh)

SN	Land details	NFSM	Non-NFSM
1.	Total owned land	4.05	2.62
2.	Un-cultivated land/Fallow land	0.07	0.04
3.	Cultivated land (Own)	3.98	2.58
4.	Leased-in land	0.36	---
5.	Leased-out land	---	0.26
6.	Net Operated Area(3+4+5)	4.34	2.32
7.	Gross Cropped Area	6.38	3.55
8.	Net Irrigation Area	3.27	1.92
9.	Gross Irrigated Area	4.69	2.72
10.	Cropping Intensity (%)	147.66	153.02
11.	Irrigation Intensity (%)	143.42	141.66

Source: Field Survey
**Cropping Intensity= (Gross Cropped Area/Net Cropped Area)*100*
***Irrigation Intensity= (Gross Irrigated Area/Net Irrigated Area)*100*

3.3 Sources of Irrigation and Structure of Tenancy

The details on sources of irrigation are presented in table 3.3. An analysis of this table shows that about 75 per cent land of beneficiary households and about 25 per cent land of non-beneficiary households was irrigated. Among the sources of irrigation, ground water was the main source of irrigation to both the sample groups. The tube well source of irrigation accounted for about 79 per cent area under irrigation in case of beneficiary households, whereas it was about 68 per cent in case of non-beneficiary households. The canal irrigation was no source of irrigation among sample households in both cases (beneficiary and non-beneficiary households). The canal and tube well irrigation was second most important source of irrigation which accounted for about 14 per cent and 16 per cent with respect to beneficiary and non-beneficiary sample households. The share of tank and open well irrigation in total net irrigated area of non-beneficiary households was significantly higher (15.51%) than beneficiary households (6.77%). Therefore, the selected households in both groups were well protected with supporting irrigation in the crop production.

Table 3.3: Distribution of Area by Source of Irrigation (% to total area/household)

SN.	Land details	NFSM	Non-NFSM
		% to total area/Hh	% to total area/Hh
A.	Irrigation	---	---
1.	Irrigated Area	75.43	67.62
2.	Un-irrigated Area	24.57	32.38
3.	Total Area	100.00	100.00
B.	Source of Irrigation (Net)		
1.	Only Canal	---	---
2.	Only tube well (Electric/Diesel)	79.05	68.03
3.	Canal & tube well (Electric/Diesel)	14.18	16.46
4.	Tank & others (Open well)	6.77	15.51
C.	Total irrigated area per households (acre)	0.33	0.99
D.	Total rainfed area per households (acre)	---	---

Source: Field Survey.

The details of tenancy are presented in table 3.4. An analysis of this table indicates that only 42.65 per cent of leased-in was taken by beneficiary household on fixed rent on cash basis, followed by share cropping (36.21%) and fixed rent in kind (21.14%). The pattern of leasing-out of land was not followed by beneficiary households whereas the pattern of leasing-in of land was not followed by non-beneficiary households. In case of non-beneficiary households, fixed rent in cash pattern in leased-out land accounted for highest share (44.15%) in total land leased-out followed by share cropping (34.62%) and fixed rest in kind pattern (21.23%).

Therefore, the percentage share of fixed rent in kind pattern of leased-in and leased-out in NFSM sample households and non-NFSM households was almost same (about 21%). The rate of taking land on leased-in was found higher than that for leased-out in sample area.

Table 3.4: Nature of Tenancy in Leasing-in/Leasing-out Land (% to the total leased-in/leased-out area)

SN	Terms of leasing	NFSM				Non-NFSM			
		Leasing -in (%)	Value (Rs./acre)	Leasing -out (%)	Value (Rs./acre)	Leasing -in (%)	Value (Rs./acre)	Leasing -out (%)	Value (Rs./acre)
1.	Share cropping	36.21	3825	0.00	0.00	0.00	00	34.62	36.05
2.	Fixed rent in cash	42.65	6578	0.00	0.00	0.00	00	44.15	5865
3.	Fixed rent in kind	21.14	5291	0.00	0.00	0.00	00	21.23	4818
4.	Both (cash and kind)	--	--	--	--	--	--	--	--
5.	Against labour	--	--	--	--	--	--	--	--
6.	Others	--	--	--	--	--	--	--	--
	Aggregate	100.00	5231	0.00	0.00	0.00	00	100.00	44.63

Note: In case of fixed rent, total value of cash/kind paid / received for leasing-in / out(Rs/acre) in the parenthesis.

 # Estimated net returns from crops grown on leasing-in/out with its share of cropping.

Source: Field survey.

In case of share cropping, the land was taken for cultivation having share in crop production/output at the rate of 50:50 between sample household and land owner (who leased-out) respectively. In this arrangement, the cost of cultivation is shared equally by both the parties.

3.4 Cropping Pattern and per acre costs and returns

The cropping pattern of sample households is presented in table 3.5. An analysis of this table reveals that cereal crops accounted as major share of 88.40 per cent in GCA of beneficiary households, whereas that was 82.44 per cent in non-beneficiary households. The area share of total pulses was little in cropping pattern accounting for 4.83 per cent and 5.69 per cent area of GCA of beneficiary and non-beneficiary households respectively. Thus, total food grains crop area share in GCA was higher in case of beneficiary (93.23%) than non-beneficiary households (88.13%). In case of oilseeds, non-beneficiary households had allotted more land to oilseeds than beneficiary households. Paddy and wheat were the main cereal crops grown by sample households followed by maize crops. This is meant for both beneficiaries and non-beneficiaries households. Arhar and lentil were major pulse crops grown. Rapeseed and mustard accounted significant share in area under oilseeds of sample households. In case of sugarcane, non-beneficiary households had higher share in area (4.65%) than beneficiary households (2.15%). There was no share of area under vegetables in case of beneficiary household whereas that was (3.06%) in case of non-beneficiary households.

The details on household income earned from agricultural and non-agricultural sources of sample households are presented in table 3.6 (a). The analysis of this table shows that net return per household as well as per acre of NSA under crop cultivation was higher in case of beneficiary household than non-beneficiary household, which was calculated to be Rs. 98672.60 per household and Rs. 22735.62 per acre of NSA in beneficiary household, while that was Rs. 55210.25 per household and Rs. 19440.23 per acre of NSA for non-beneficiary household. However, per household non-farm income was higher in non-beneficiary household, may due to low share of family members in agriculture and, thus dependence on non-farm activities.

Table 3.5: Cropping pattern of sample HH (% of Gross Cropped Area)

Name of the Crop	NFSM	Non-NFSM
Cereals		
Paddy	48.25	43.82
Wheat	32.05	28.54
Maize	8.10	10.08
Jowar	---	---
Bajra	---	---
Ragi	---	---
Total Cereals	88.40	82.44
Pulses		
Lentil	1.28	1.58
Pea	1.22	1.32
Arhar (Tur)	2.33	2.79
pulses	4.83	5.69
Total food grain	**93.23**	**88.13**
Oilseeds		
Sunflower	0.52	0.84
Linseed	0.68	0.98
Rape & Mustard	1.38	2.34
Other Oilseeds	2.04	---
Oilseed total	**4.62**	**4.16**
Cotton	---	---
Jute & Mesta	---	---
Sugarcane	2.15	4.65
Fruits	---	---
Vegetables	---	3.06
Flowers	---	---
Spices	---	---
Plantation	---	---
Fodder	---	---
Forest species	---	---
Others total	2.15	7.71
Gross Cropped Area (%)	100.00	100.00
Gross Cropped Area (acre)	1914	355

Table 3.6 (a): Household Income from Agricultural and Non Agricultural Sources

Costs and returns particulars	NFSM		Non-NFSM	
	Rs. per household	Rs. per acre	Rs. per household	Rs. per acre
Value of output (main + by-product)	159849.61	36831.71	96135.34	33850.47
Cost of production	61177.01	14096.08	40925.10	14410.24
Net returns (Farm business income)	98672.60	22735.62	55210.25	19440.23
Non-farm income	24549.47	5656.55	25833.36	9096.25
Total income	123222.07	28392.18	181043.61	28536.48

The crop wise per acre costs and returns among the sample households are presented in table 3.6 (b). An analysis of this table shows that the average level of productivity of all cereal crops was found higher in beneficiary sample households than non-beneficiary sample households. The per acre yield difference between

beneficiaries and non-beneficiaries of paddy crop was 1.68 quintals, which is, of course, more than that of maize. In case of maize crop, average yield realized by beneficiary sample households was 15.60 qtls/acre, whereas that was 14.65 qtls/acre in case of non-beneficiary sample households. Higher yield difference in case of paddy in comparison to maize between beneficiary and non-beneficiary sample Hhs may be due to better training and package of practices and greater availability of improved seeds to NFSM beneficiaries. No such specific programme, and use of SRI and SWI techniques were prevalent in case of maize. Both NFSM and non-NFSM farmers generally used traditional methods of cultivation and similar types/varieties of other inputs, like seed. So, the yield difference is lower in maize as compared to paddy. Except maize, net return obtained by beneficiary households in all other cereal crops was higher than non-beneficiary group. In case of wheat cultivation, net returns per acre obtained by beneficiary household was Rs. 12,600/-, whereas that was Rs. 8,900/- per acre in case of non-beneficiary households. The pulses such as; arhar and lentil were grown by both groups, wherein rate of yield as well as net return was higher in case of non-beneficiary households. In case of all oilseed crops, beneficiary household had obtained higher returns than non-beneficiary households.

Table 3.6 (b): Crop wise per acre costs and returns among the sample Hhs

Name of the Crop	NFSM				Non-NFSM			
	Yield (Qtls/ acre)	Gross returns (Rs. / acre)	Cost of cultivation (Rs. / acre)	Net Returns (Rs. / acre)	Yield (Qtls/ acre)	Gross returns (Rs. / acre)	Cost of cultivation (Rs. / acre)	Net Returns (Rs. / acre)
Cereals								
Paddy	20.18	26850	14250	12600	18.50	21650	12750	8900
Wheat	18.35	22310	12815	9495	16.75	19450	10610	8840
Jowar	---	---	---	---	4.75	8625	4720	3905
Bajra	---	---	---	---	12.05	9210	5250	3960
Maize	15.60	18230	8690	9540	14.65	16410	7315	9095
Ragi	---	---	---	---	---	---	---	---
Minor Cereals	NA	---	---	---	---	---	---	---
Pulses								
Lentil	6.00	20550	7250	13300	5.50	19220	7125	12095
Pea	9.15	21420	8625	12795	8.10	18630	8320	10310
Arhar	10.70	32650	10250	22400	9.25	28925	9230	19695
Oilseeds								
Groundnut	---	---	---	---	---	---	---	---
Sunflower	---	---	---	---	---	---	---	---
Linseed	4.05	7290	3410	3880	3.85	6450	3365	3085
Rape & Mustard	8.85	17650	7540	10110	7.65	15215	7105	8110
Other Oilseeds	NA	---	---	---	---	---	---	---
Others								
Cotton	---	---	---	---	---	---	---	---
Jute & Mesta	---	---	---	---	---	---	---	---
Sugarcane	450.00	14650	6575	8075	NA	---	---	---

3.5 Farm Assets Holdings

The details on farm assets holding by sample households are presented in table 3.7. The analysis of this table reveals that in case of beneficiary households, only tractors costing about Rs. 324210 was owned as tillage equipment. The plough was owned as land preparation equipment costing Rs. 2530 whereas, in case of non beneficiary households tractor costing Rs. 155020 was owned along with plough whose costing was Rs. 2150. The cost of harrow in case of both beneficiary and non-beneficiary were almost same. Thus, the assets owned by the both beneficiary as well as non-beneficiary household for land development were very poor in study area. There were no sowing; planting equipment and equipment for residue management along with post harvest and agro processing machines owned either by beneficiary or non-beneficiary households. Plant protection equipment owned by both beneficiary and non-beneficiary farmers costing was Rs. 2568 and Rs. 4230 respectively. As water lifting equipment only pump sets were found to be owned costing Rs. 32810 in case of beneficiary farmers whereas that was Rs. 28950 for non-beneficiary farmers. Thus, the total farm assets owned by beneficiary costing Rs. 362328 while that was costing for Rs. 193412 in case of non-beneficiary households on grand level which shows the poor farm assets holding capacity of the farmers under survey area.

Table 3.7: Farm assets holding by sample HHs (Rs./HH)

Equipment code	Implements	NFSM	Non-NFSM
		Value (Rs.)	Value (Rs.)
Land development, tillage and seed bed preparation equipments (1 to 7)			
1	Tractor/mini tractor	324210	155020
2	Rotavator	---	---
3	Tiller	---	---
4	Cultivators	---	---
5	Ploughs	2530	2150
6	Harrow	210	190
7	Others	---	---
Sowing and Planting equipments (8 to 13)			
8	Seed drill	---	---
9	Drum seeder	---	---
10	Transplantor	---	---
11	Furrow opener	---	---
12	Seed cum fertilizer drill	---	---
13	Others	---	---
Plant protection equipments (14 & 15)			
14	Sprayers	2568	4230
15	Other Plant protection equipments	---	---
Harvesting and threshing equipments (16 to 20)			

16	Cutters	---	---
17	Harvesters	---	---
18	Thresher	---	---
19	Laveller blade	---	---
20	Others	---	---
Equipments for residue management (21 to 23)			
21	Brush cutter	---	---
22	crusher	---	---
23	Others	---	---
Post harvest and agro-processing machines (24 & 25)			
24	Chopper	---	---
25	Others	---	---
Water lifting implements (26 to 28)			
26	Pump set	32810	28950
27	Sprinkler	---	---
28	Others	---	---
Others			
29	Others	3850	2872
Grand Total		362328	193412

3.6 Sources and Purposes of Credit

In regard to sources of credit availed by NFSM beneficiary surveyed households, Commercial Banks were prominent (25.33%). It was followed by PACS (19.33%). A meager of 1.33 per cent beneficiary farm households were found to have taken loan from moneylenders. In case of non-NFSM sample households, PACS was found to be mere instrumental (32%) them Commercial Banks (25%). Non-formal source of credit, i.e., moneylender was more easily accessible source of credit for non-NFSM respondents (3%).

Table 3.8: Details of source of credit by the sample Hhs

Source of credit	NFSM		Non-NFSM	
	No. of HH of the total in %	Outstanding amount (Rs/hh)	No. of HH of the total in %	Outstanding Amount (Rs/hh)
Commercial Banks	25.33	105620	25.00	98625
PACS	19.33	76850	32.00	65750
Government Agency	---	---		---
Intermediaries/Informal				
Money Lender	1.34	48345	3.00	42810
Total No. of Hh	46.00	---	60.00	---

Source: Field survey.

The details on purpose wise credit taken by the sample households are shown in table 3.9. An analysis of this table reveals that all the farmers had taken loan for productive uses only. As far the amounts of credit per household for agriculture purpose is concerned, NFSM beneficiary sample households were ahead Rs.

1,20,350/-, whereas in case of non-NFSM sample households, it was Rs. 1,05,650/-. In regard to other purposes under productive uses the quantums of credit were much higher in both the cases. It was more in case of non-NFSM households Rs. 3,55,210/- than the NFSM sample households Rs. 3,21,540/-.

Table 3.9: Details of purpose of credit by the sample HHs (Rs./HH)

Purposes	Purpose of credit	NFSM	Non-NFSM
		Rs./Hh	Rs./Hh
Productive uses	Agriculture	120350	105650
	Animal Husbandry	---	---
	Others	321540	355210
	Total	441890	460860
Non productive uses	Daily consumption	---	---
	Social	---	---
	Others	---	---
	Total	---	---

Source: Field survey.

3.7 Summary of the Chapter

Some of the important point find out from above analysis as follows:

- The sample beneficiary households were relatively large in size, more dependence on agriculture with 1.52 times higher average holding size than sample non-beneficiary farmers.
- The average family size of beneficiary households was 7.38, whereas that was 6.25 in case of non-beneficiary households.
- The average size of operated land holding was 4.34 and 2.84 with regards to beneficiary and non-beneficiary households respectively. Both categories households were dominated by male respondents thus decisions were mostly taken by male head members.
- Only 66.58 per cent members of beneficiary households and 62.45 per cent members of non-beneficiary households were engaged in agriculture thus, the major source of income for both categories of households was agriculture.
- The social classification of selected beneficiary households indicate that the percentage of other backward classes was highest (54.68%) followed by general category households (33.02%) and lowest share was of SC category households (12.30%). Almost similar trend was found in case of non-beneficiaries. The percentages of OBC category of non-beneficiary respondents were (58.33) followed by general category (25%) and SC (16.68%).
- Only 77.75 per cent beneficiary holders which were marginal and small farmers together had hold largely 50.90 per cent area of total land holdings, whereas in case of non-beneficiary households, total 83 per cent small and marginal holders held together 42 per cent share in total land holding area.

- The average net operated land holding size was higher in beneficiary households (4.34 acre) than non-beneficiary (2.84 acre).
- About 75 per cent land of beneficiary households and about 68 per cent land of non-beneficiary households was irrigated and ground water was the main sources of irrigation for both the group.
- Only 42.65 per cent of leased-in was taken by beneficiary household on fixed rent on cash basis, followed by share cropping (36.21%) and fixed rent in kind (21.14%). The pattern of leasing-out of land was not followed by beneficiary households whereas the pattern of leasing-in of land was not followed by non-beneficiary households. In case of non-beneficiary households, fixed rent in cash pattern in leased-out land accounted for highest share (44.15%) in total land leased-out followed by share cropping (34.62%) and fixed rest in kind pattern (21.23%).
- The total food grain crops share in GCA was higher in case of beneficiary household than non beneficiary household. The paddy and wheat were the main cereal crops grown followed by maize and pulses.
- The net return per household as well as per acre of crop cultivation was higher in case of beneficiary household than non-beneficiary households.
- Average level of productivity of all cereal crops was recorded higher in beneficiary household than non beneficiary households.
- Availability of farm implements, machineries and equipments were relatively better with beneficiary households than non-beneficiary households.
- Out of the total selected beneficiary households, 46 per cent had taken loan, whereas in case of non-beneficiary, same was 60 per cent. The major source of credit was Commercial Bank (25.33%) among beneficiary households followed by PACS (19.33%) and money lender (1.34%), whereas in case of non-beneficiary household, major source of credit was PACS (32%) followed by Commercial Bank (25%) and money lenders (3%).
- The amounts of credit per household for agriculture purpose is concerned, NFSM beneficiary sample households were ahead Rs. 1,20,350/-, whereas in case of non-NFSM sample households, it was Rs. 1,05,650/-. In regard to other purposes under productive uses the quantums of credit were much higher in both the cases. It was more in case of non-NFSM households Rs. 3,55,210/- than the NFSM sample households Rs. 3,21,540/-.

CHAPTER – IV

NFSM INTERVENTIONS AND ITS IMPACT ON FARMING

4.1 Awareness of NFSM

It would be important to know about the awareness of NFSM among the selected sample beneficiary households in order to check effect of agricultural extension activities undertaken by the local government offices. The analysis of table 4.1 (a) reveals that only 58.33 per cent beneficiary households were aware about NFSM and 25.67 per cent farmers had availed the benefit without knowing about NFSM, while about 16 per cent beneficiary household did not reply.

Table No. 4.1: (a) Awareness of NFSM among the Sample beneficiaries

SN	Details of Awareness	Percentage
1.	% of beneficiaries aware about the NFSM	58.33
2.	% of beneficiaries not aware about the NFSM	25.67
3.	% of beneficiaries who did not reply	16.00

Source: Field Survey.

Table No. 4.1 (b): Sources of awareness of NFSM among the Sample beneficiaries

SN	Sources of Awareness	% to total aware beneficiaries
1.	Newspaper	10.34
2.	Agriculture Department	68.45
3.	State Agricultural Universities	---
4.	Krishi Vignyan Kendra	1.82
5.	Raitha Samparka Kendra	---
6.	Farmers/Friends	9.19
7.	Input Suppliers	---
8.	Agri Exhibitions	5.06
9.	ZP/TP/GP	3.72
10.	Others	2.86
11.	Total	---

Note: Multiple Sources, total may not tally to 100

Analysis of table 4.1 (b) reveals that only 68.45 per cent beneficiary households had received information on NFSM from Agriculture department, followed by Newspaper (10.34%), Agriculture Exhibitions and Farmers/Friends (9.19%) and, also by KVK. Thus, the agriculture extension system of State Government was reported active in sample area.

4.2 Costs and Subsidy Particulars of availed NFSM benefits

The details of benefits availed by selected beneficiary households are presented in table 4.2. The benefits item wise distribution of sample beneficiary households

indicate that the largest number of beneficiaries (52.67%) had availed the benefit of seed minikits of HYV/hybrid rice with demonstration, followed by benefit of conoweeder (34.67%), knap sack sprayer (24.33%), integrated nutrient management (18.33%), plant protection chemical (17.33%), integrated pest management (16%), pump set (16.67%) and incentive for micro nutrients (4.33%). It was observed from analysis that 100 per cent subsidy benefit was availed by sample farmers under minikit seed distribution with field level demonstration. In the remaining others benefit item 50 per cent subsidy was availed by sample beneficiary households.

Table 4.2: Particulars of benefit availed (2007-08 up to 2013-14)

Sl. No	Benefit Item Name	No. of HHs benefitted to aggregate beneficiaries	Avg. total cost (Rs. per HH benefited)	Subsidy as a % of total cost
1	Production of seeds- Certified seed	---	---	---
2	Seed minikits of high yielding varieties/hybrid rice	52.67	3000	100
3	Incentive for micro nutrients (in deficit soils)	4.33	500	50
4	Incentive for lime in acid soils	---	---	50
5	Machineries/Tools	---	---	---
6	Cono weeder	34.67	3000	50
7	Zero till seed drills	---	15000	50
8	Multi-crop planters	---	15000	50
9	Seed drills	---	15000	50
10	Rotavators	---	30000	50
11	Pump sets	16.67	10000	50
12	Power weeder	---	15000	50
13	Knap Sack Sprayers (Manual and Power Operated)	24.33	3000	50
14	Sprinkler	---	---	50
15	Plant protection chemicals	17.33	500	50
16	Integrated Nutrient Management	18.33	---	---
17	Integrated Pest Management	16.00	---	---
18	Training	---	---	---
19	Others	---	---	---
	Total	**---**	**---**	**---**

Note: NA-Not available; More than one benefit availed, therefore total would more than 300/percentage exceeds 100.

4.3 Annual Usage of Farm Equipments and their benefits

It would be important to know about the annual usage of farm equipments availed under NFSM scheme by beneficiary farmer households. It was found from table 4.3 that knap sack sprayers was used by the sample households only on their own field and not rented out. However, other implements were used on own farm by beneficiary households as well as it was rented out. Zero till seed drill was used 16 days on own field and their imputed value was Rs. 4320, whereas it was rented out more than own use which earned Rs. 11350 in the reference year. In case of rotavator, beneficiary households used it for about 8 day on their own field and then rented out having total earning Rs. 28540/annum. Pump set was heavily used by selected/sample farmers on their own land as compared to other equipments and

also rented out earned Rs. 7570/annum. Thus, sample farmer households had not benefited only with subsidy amount for particular item, they also earned extra money by renting out the implement.

Table 4.3: Annual usage of farm equipments availed under NFSM (Per annum)

Sl. No.	Name of the implement (manual)	No. of days used per benefited HH	Area covered per benefited HH (acres)	Imputed value own use (Rs/ benefitted HH)	Rented value (Rs/ benefitted HH)
1	Knap sack sprayer	18.55	23.75	250	0.00
2	Zero till seed drill	16.15	12.50	4320	11350
3	Machineries/Tool	12.35	13.75	2540	4360
4	Pump set	46.50	11.08	6410	7570
5	Rotavators	8.25	9.30	16355	28540
	Total	101.80	70.38	13520	60101

**Use one manday=8 hrs for estimating No. of days used per implement per annum*

The benefits derived from equipments (% of benefited Hhs) are shown in table 4.4. An analysis of this table reveals that more than 38 per cent beneficiary households viewed that knap sac sprayers has helped in controlling weed, about 25 per cent farmer mentioned that it helped them in timely operations, 18 per cent sample households reported that it helped in solving problem of labour shortage followed by reduced cost of cultivation (12.25%), good plant growth (8.55%) and some other. About half of the selected farmers had viewed that zero till seed drill had helped them in timely operation followed by solved labour shortage (35.45%), weed control (26.34%), good plant growth (25.20%), increased cropping intensity (20.56%) and reduced drudgery. Pump set is an important equipment for agriculture activities and most of the farmers spent more money on irrigation, now they could save due to use of their own pump set thus reduced cost of cultivation, (8.10%), helped in timely operation (38.25%), good plant growth (14.35%), also increased cropping intensity (16.20%). Rotavators was another important equipment benefit availed by sample farmers which helped in controlling weed (45.30%) followed by solved labour shortage (32.50%), increased cropping intensity (24.25%) and other equipment used as minor helper. Some of the machineries /tools used by beneficiary households reported that it helped them in solving labour shortage (6.25%) followed by timely operation (4.36%), weed control (3.58%) and goo plant growth (2.92%) also effected minorly in other activities.

Table 4.4: Benefits derived from Farm equipments (% of benefitted Household)

SN	Benefit derived/ Name of the implement	Knap sack sprayer	Zero till seed drill	Pump set	Rotavator	Machineries/ Tools
1	Solved labour shortage	18.26	35.75	12.30	32.50	6.25
2	Timely operations	25.15	40.25	38.25	---	4.36
3	Saved water	4.30	3.48	---	---	---
4	Weed control	38.42	26.34	---	40.30	3.58
5	Good plant growth	8.55	25.20	14.35	12.25	2.92
6	Reduced drudgery	1.82	6.54	4.40	15.35	0.75
7	Helped in transportation	---	---	---	---	---
8	Reduced cost of cultivation	12.25	26.24	8.10	15.40	1.68
9	Increased cropping intensity	---	20.56	16.20	24.25	---
10	Reduced post harvest losses	---	---	---	---	---

Note: Figures may not add up to 100 due to multiple responses
**Add more columns in case of more than 4 farm equipments and machinery*
Source: Field Survey Data.

The benefit availed under NFSM through various component as knap sack sprayer, zero till seed drill, pump set, rotavator and machineries/tool and their impact on productivity, reduction in material cost, water use, labour cost and losses after intervention, improvement in soil health is presented in table 4.5. An analysis of this table reveals that maximum increase (2 to 5%) in productivity was found due to zero till seed drill followed by pump set (up to 5%), rotavator (up to 3%), knap sack sprayer (up to 2%) and machineries/tools (up to 1%). The 2-4 per cent reduction in material cost was found due to machineries/tools followed by pump set (up to 1%). Zero till seed dill was found to be beneficial for reduction in water use up to (up to 3%). The entire instrument mentioned above was found to be responsible in reduction of labour cost. Thus, zero till seed drill records maximum 6 per cent fall in labour cost followed by rotavator (up to 5%), machineries/tools (1-4%), knap sack sprayer (up to 3%) and pump set (up to 2%).

Out of all implements mentioned in table 4.5, only knap sack sprayer and pump set was responsible for per cent reduction in losses after intervention with 2-4 per cent and 1-5 per cent respectively. The knap sack sprayer, zero till seed drill, pump set, rotavator and machineries/tools was responsible for percentage increase in price of the output because of better quality of seed, thus, pump set was more responsible for maximum 2-2.5 per cent increase in the price of output due to better quality of seed followed by knapsack sprayer (1-2.5%), zero till seed drill (up to 4%) and machineries/tools up to 3 per cent. The sample farmers reply that all the above instruments used was useful for soil health. However, more than 25 per cent of farmers had replied that use of zero till seed drill had impacted as improvement in soil health followed by knapsack sprayer, pump set, rotavator and

machineries/tools with 20.35%, 18.45%, 12.60 and 7.55 per cent of sample respondents. Thereafter, there were no any respondent had viewed in favour of improvement in human health.

Table No. 4.5: Impact of the Benefit availed under NFSM.

SN	Benefit derived/ Name of the implement	Knap sack sprayer (%)	Zero till seed drill (%)	Pump set (%)	Rotavator (%)	Machineries/ Tools (%)
1	% increase in productivity	0-2.1	2-6	0-5	0-3	0-1
2	% fall in material cost	---	---	0-1	---	2-4
3	% fall in water use	---	0-3	---	---	---
4	% fall in labour cost	0-3	1-6	0-2	0-5	1-4
5	% reduction in losses after intervention	2-4	---	1-5	---	---
6	% increase in price of the output because of better quality	1-2.5	0-4	2-2.5	0-2	0-3
7	Improvement in soil health (% of Hhs who have mentioned "yes")	20.35	25.15	18.45	12.60	7.55
8	Improvement in human health (% of Hhs who have mentioned "yes")	---	---	---	---	---

Source: Field survey.

4.4 Per acre Cost and Return of Paddy (2012-13)

The cost and return of paddy per acre during kharif (2012-13) on NFSM and Non-NFSM was analyzed in table 4.6. It indicates that total cost of cultivation per acre of paddy for NFSM farms was Rs. 6072 as against Rs. 6445 per acre on non-NFSM farms. Thus, the cost per acre was slightly higher on non-NFSM farms in comparison to NFSM farms. The breakup of cost shows that the maximum cost was incurred on tractor/tiller being higher than labour cost followed by seed, harvesting/threshing cost and fertilizer cost in both NFSM and non-NFSM farms. Accordingly, the cost per quintal was higher Rs. 413.14 on non-NFSM farms than NFSM farms at Rs. 379.50, while gross income was comparatively higher on NFSM farm than Non-NFSM farms. The net income per acre was also higher on NFSM farms Rs. 10,994/- than non-NFSM farms Rs. 9,999.47. However, this clearly indicated that the impact of NFSM on paddy production was significant in the area of study. The cultivation of rabi/summer paddy did not prevail in sample areas, thus cost of cultivation regarding rabi/summer paddy could not be calculated.

Table 4.6: Per acre cost and return of paddy in *Kharif* 2012-13

Particulars	Unit	NFSM		Non-NFSM	
		Quantity	Value (Rs.)	Quantity	Value (Rs.)
Hired labour	Mandays	15	1650	17	1870
Family Labour	Mandays	12	---	10	---
Bullocks	Pair/day	---	---	---	---
Tractor/Tiller	Hours	6	2100	6	2120
Seed	Kgs	20	1210	22	1320
FYM/Organic/ Bio-fertilizers	Tonnes	---	---	---	---
Fertilizers	Kgs	55	412	60	447
Pesticides	Kg/lit	---	---	---	---
Irrigation charges	Rs.	---	---	---	---
Harvesting & Threshing	Rs.	---	700	---	688
Bagging, Transportation & marketing cost	Rs.	---	---	---	---
Total cost	Rs.	---	6072.00	---	6445.00
Main product	Kgs	845.90	12266.00	828.50	11764.47
By-product	Kgs	1600.00	4800.00	1,560.00	4680.00
Gross Income	Rs.	---	170766.00	---	16444.47
Net Income	Rs.	---	10994.00	---	9999.47
Cost per quintal	Rs.	---	379.50	---	413.14

4.5 Marketing Channels and Marketed Surplus of Paddy

The details of marketing channels and marketed surplus of paddy was worked out in table 4.7 reveals that only 48.25 per cent beneficiary households and 46.78 per cent non beneficiary households had sold their output at local market whereas more than 34 per cent of beneficiary households and about 32.64 per cent of non beneficiary households had sold their produce at wholesale market and remaining households of both beneficiary and non beneficiary sample had sold their output to the merchants.

Table 4.7: Marketing channels and marketed surplus of Paddy* or Wheat*

Sl. No.	Particulars of output sold	NFSM		Non-NFSM	
		% of HH to the total	% of the value marketed	% of HH to the total	% of the value marketed
1	Wholesale market	34.58	33.45	32.64	28.96
2	Local market	48.25	47.30	46.78	48.58
3	Merchant	17.17	19.25	20.58	22.46
4	Co-operative	---	---	---	---
5	Government	---	---	---	---
6	Intermediaries	---	---	---	---
7	Private company	---	---	---	---
8	Mills	---	---	---	---
9	Others	---	---	---	---

Source: Field Survey

4.6 Summary of Chapter

The some of the major points emerged from this chapter after analyses are as below:

- Only 58.33 per cent beneficiary households were aware about the NFSM and 25.67 per cent farmers had availed the benefit without knowing about NFSM, while 16 per cent beneficiary households did not reply.
- Only 68.45 per cent beneficiary households had received information on NFSM from Agriculture department, followed by Newspaper (10.34%), Agriculture Exhibitions and Farmers/Friends (9.19%) and, also by KVK.
- The largest number of beneficiaries (52.67%) had availed the benefit of seed minikits of HYV/hybrid rice with demonstration, followed by benefit of conoweeder (34.67%), knap sack sprayer (24.33%), integrated nutrient management (18.33%), plant protection chemical (17.33%), integrated pest management (16%), pump set (16.67%) and incentive for micro nutrients (4.33%).
- 100 per cent subsidy benefit was availed by sample farmers under minikit seed distribution with field level demonstration. In the remaining others benefit item 50 per cent subsidy was availed by sample beneficiary households.
- Knap sack prayer was used by sample households only on their own field but not rented out while; other implements were used on their own farm as well as rented out.
- Sample farmers had not only benefited with subsidy amount for their own use but also earned extra money by renting out the implements.
- About half of the selected farmers had viewed that zero till seed drill helpful in timely operation followed by solved labour shortage (35.45%), weed control (26.34%), good plant growth (25.20%), increased cropping intensity (20.56%) and reduced drudgery.
- All the equipments of beneficiary households were found to be responsible in reduction of labour cost while zero till seed drill records maximum 6 per cent fall in labour cost followed by rotavator, machineries/tools, knap sack sprayer and pump set.
- Out of all implements mentioned in table 4.5, only knap sack sprayer and pump set was responsible for per cent reduction in losses after intervention with 2-4 per cent and 1-5 per cent respectively.
- All the implements mentioned in table 4-5 was responsible for percentage increase in the price of out-put because of better quality of seeds whereas pump set only more responsible for maximum 2-2.5% increase in the price of output followed by knap sack sprayer (1-2.5%), zero till seed drill (up to 4%) and machineries/tools by 3 per cent.

- More than 25 per cent of farmers had replied that use of zero till seed drill had impacted as improvement in soil health followed by knapsack sprayer, pump set, rotavator and machineries/tools with 20.35%, 18.45%, 12.60 and 7.55 per cent of sample respondents. Thereafter, there were no any respondent had viewed in favour of improvement in human health.
- The cost per quintal was higher Rs. 413.14 on non-NFSM farms than NFSM farms at Rs. 379.50, while gross income was comparatively higher on NFSM farm than Non-NFSM farms.
- The net income per acre was also higher on NFSM farms Rs. 10,994/- than non-NFSM farms Rs. 9,999.47. However, this clearly indicated that the impact of NFSM on paddy production was significant in the area of study.
- Only 48.25 per cent beneficiary household and 46.78 per cent non-beneficiary households had sold their output at local market, whereas more than 34 per cent of beneficiary households and 32.64 per cent of non beneficiary households had sold their produces at wholesale market, and remaining households of both beneficiary and non-beneficiary sample farmers had sold their output to the merchants.

CHAPTER – V

PARTICIPATION DECISION, CONSTRAINTS AND SUGGESTIONS FOR IMPROVEMENT OF NFSM

This chapter mainly deals with factors influencing participation of farmers in NFSM, constraints faced in availing NFSM benefits, suggestions for improvement of NFSM and reasons for non-participation in the NFSM along with suggestions for the inclusion of non-beneficiary for availing benefits under NFSM.

5.1 Factors Influencing Participation in NFSM

The logistic regression equation/formula was applied to analyze the factors influencing participation in NFSM by the beneficiaries. The independent variable such as age in years (x_1), education in number of years in school (x_2), operational holding acres (x_3), family size or no. of family members dependents on farming (x_4), OBC (x_5), General (x_6), income from farming (x_7), credit availed acre (x_8) and farm asset value Rs. (x_9), have been considered to analyze the participation in NFSM (Y).

Table 5.1: Factors influencing participation in NFSM (Dependent variable (Y): 1 for NFSM beneficiaries; otherwise: 0)

Independent variables	Coefficient(S.E)	P-Value
Age (Years) (x_1)	-0.028 (0.010)	0.006
Education in No. of years in school (x_2)	0.148 (0.038)	0.000
Operational holdings (acres) (x_3)	-0.054 (0.033)	0.007
Family size or No. of family members dependent on farming (x_4)	0.163 (0.058)	0.001
Caste		
OBC (x_5)	1.238 (0.389)	0.001
General (x_6)	0.432 (0.316)	0.168
Income from farming (x_7)	0.000 (0.000)	0.054
Credit availed (per acre) (x_8)	0.000 (0.000)	0.049
Farm asset value (Rs.) (x_9)	0.000 (0.000)	0.702
Constant (a)	-0.438 (0.86)	0.548
Likelihood ratio test statistic	369.389	

Note: Figure in parentheses shows standard error.

The likelihood ratio test statistics was estimated to be 369 in the fitted logistic regression equation, which reveals that 369 out of 400 respondents were likely to participate in NFSM in the study area with independent variables taken in to consideration. Age (-0.028) was found to be negative and highly significant to the participation among different independent variable, while caste i.e., OBC (1.238),

number of family members dependent on farming (0.163), income from farming (0.000), credit availed (0.000) were also found to be positive and significant as far as participation in NFSM is concerned. Whereas, caste general (0.432), farm asset value (0.000) were positive but non-significant to the participation in NFSM. Operational land holding (-0.054) was found to be negative and non significant. It reveals that respondent related to OBC having young age, more education, more number of family dependent on farming, more income from farming, more credit availed from different institutions and small holdings are likely to participate more in the NFSM (table 5.1). Number of family members dependent on farming, caste factor and education in terms of number of years in school are some of the prominently revealed factors that positively influence participation in NFSM.

5.2 Constraints Faced in availing the NFSM benefits

The details of constraints faced by beneficiary farmer in availing the NFSM benefit is presented in table 5.2. The table reveals that more than 78 per cent of the selected beneficiary farmers had the problem of arranging initial payment since subsidy would be after purchase Even if they arrange the initial money by some sources, the other problem was long time gap between the purchase and receiving the subsidy amount as mentioned by around (48 % of the sample beneficiary), poor quality of materials/machinery are supplied (26.48%), institutional financing facility not available under the programme (25.78%) and so on.

Table 5.2: Constraints faced in availing the NFSM benefits (Beneficiary)

% of beneficiaries faced problem/s while availing the scheme		Responses	
Sl. No	**Constraints**	**Yes (%)**	**No (%)**
1	Information about NFSM reaches comprehensively to the households	14.98	85.02
2	Eligibility or criteria for availing the subsidy is provided to the households	10.59	89.41
3	Procedure for the subsidy quite easy (if no provide details in remarks)	12.45	87.55
4	Only few documents are required for availing the subsidy (if no provide details in remarks)	20.14	79.86
5	Subsidy paid after purchase while initial payment remains the highest problem	78.20	21.80
6	Institutional financing facility available under the programme	25.78	74.22
7	Capacity building/technical advice is provided under the programme	8.16	91.84
8	Long time gap between the purchase and receiving the subsidy amount	48.03	51.97
9	Biased towards large land owners	18.16	81.84
10	Poor quality of materials/machinery are supplied	26.48	73.52
11	Others	12.66	87.34

Source: Field Survey data.

5.3 Suggestions for Improvement of the NFSM Scheme

The details of suggestions for improvement of the NFSM scheme as offered by beneficiary households is presented in table 5.3. The table reveals that more than 36 per cent of beneficiary households had suggested for improvement of irrigation facility whereas about 32 per cent beneficiary households told that insect-pest resistant varieties made available to the farmers on time. The other suggestions were: procurement price assumed higher than market price (26.50%), good quality material/machinery should be supplied (20.55%) and last one is procedure for receiving subsidy amount should be quite easy.

Table 5.3: Suggestions for improvement of the NFSM scheme (Beneficiary)

Sl. No.	Suggestions	% of the beneficiaries
1	Irrigation facility should be improved	36.85
2	Insect-pest resistant varieties made available to farmer	32.30
3	Procurement price assured higher than market price	26.50
4	Good quality material/machinery should be supply	20.55
5	Procedure for receiving subsidy amount should be quite easy	18.90

Source: Field survey

Table 5.4: Suggestions for improvement of the NFSM scheme (Non-Beneficiary)

Sl. No.	Suggestions	% of the non-beneficiaries
1	Needful farmer should considered under NFSM scheme	28.50
2	There should no biasness towards large farmers	26.25
3	Good quality material should be supplied	17.30
4	Insect-pest resistant varieties should be supplied	23.30
5	Procedure for receiving subsidy should be quite easy	14.65
6	Interference of political/ influential person should not allowed	34.28

Source: Field survey

The details of suggestion for improvement of the NFSM scheme by non beneficiary farmers is shown in table 5.4. An analysis of this table reveals that 34.28 per cent respondent suggested that no political influence should be entertained in implementing the scheme whereas 26.50 per cent suggested that only needful farmers should be considered under the scheme. Also, some of responses (26.25%) say there should not any bias toward large farmer while about 17 per cent replied that good quality material should be supplied.

5.4 Reasons for Non-participation in the NFSM

The details of reason for non participation in the NFSM are presented in tale 5.6. An analysis of this table reveals that 38 per cent farmers replied that they were unaware about the NFSM scheme, while 26.68 per cent farmers mentioned that scheme provides the inputs in limited quantity and not in time and therefore, they did not participate in the NFSM scheme. The other reason mentioned by non-beneficiary farmer was lower budget under scheme for subsidy. After that uncertainty in yield

of improved varieties and costly inputs were other important reason among the sample farms since farmers did not participate in NFSM scheme.

Table 5.5: Reasons for non-participation in the NFSM (Non-beneficiary)

Sl. No.	Suggestions	% of the non-beneficiaries
1	Unawareness about the NFSM scheme	38.42
2	Untimely and limited availability of seeds and other inputs	26.68
3	Inputs are costly	13.55
4	Uncertainty in yield of improved varieties	23.79
5	Lower budget under scheme for subsidies	28.15

Source: Field Survey.

5.5 Suggestions for the inclusion of Non-beneficiary for availing benefits under NFSM

The details of suggestion collected from sample farmers for the inclusion of non-beneficiary for availing benefits under NFSM is shown in table 5.7. Analysis of this table reveals that more than 68 per cent non-beneficiary households had suggested that the budget under NFSM scheme should be increased; about 49 per cent farmers replied that amount of subsidy should be increased, thereafter, more than 18 per cent farmers mentioned that special arrangement for training the farmers should be provided at local and village level and about 14 per cent farmers told that there should not any biasness toward large farmers.

Table 5.6: Suggestions for the inclusion of non- beneficiary for availing benefits under NFSM (Non-beneficiary)

Sl. No.	Suggestions	% of the non-beneficiaries
1	There should be no any biasness toward large farmer	14.38
2	There should be no limitation of kits distribution	12.55
3	Amount of subsidy should increased	49.16
4	Budget under NFSM should increased	68.34
5	Special arrangement for training should be provided	18.25

Source: Field survey.

5.6 Summary of this Chapter

- The respondent related to OBC having young age, more education, more number of families dependent on farming, more income from farming, more credit availed from different institutions and small holdings are likely to participate more in the NFSM.
- More than 78 per cent of the selected beneficiary farmers had the problem of arranging initial payment since subsidy would be after purchase Even if they arrange the initial money by some sources, the other problem was long time gap between the purchase and receiving the subsidy amount as mentioned by around (48 % of the sample beneficiary), poor quality of materials/machinery

are supplied (26.48%), institutional financing facility not available under the programme (25.78%).

- More than 36 per cent of beneficiary households had suggested for improvement of irrigation facility whereas about 32 per cent beneficiary households told that insect-pest resistant varieties made available to the farmers on time.
- 34.28 per cent responses suggested that not political influence should be entertained in implementing the scheme whereas 26.50 per cent responses suggested that only needful farmers should be considered under the scheme. Also, some of responses (26.25%) say there should not any bias toward large farmer while about 17 per cent replied that good quality material should be supplied.
- 38 per cent farmers replied that they were unaware about the NFSM scheme, while 26.68 per cent farmers mentioned that scheme provides the inputs in limited quantity and not in time and therefore, they did not participate in the NFSM scheme. The other reason mentioned by non-beneficiary farmer was lower budget under scheme for subsidy. After that uncertainty in yield of improved varieties and costly inputs were other important reason among the sample farms since farmers did not participate in NFSM scheme.
- More than 68 per cent non-beneficiary households had suggested that the budget under NFSM scheme should be increased; about 49 per cent farmers replied that amount of subsidy should be increased, thereafter, more than 18 per cent farmers mentioned that special arrangement for training the farmers should be provided at local and village level and about 14 per cent farmers told that there should not any biasness toward large farmers.

CHAPTER – VI

CONCLUDING REMARKS AND POLICY SUGGESTIONS

6.1 Introduction

6.1.1 Introduction

Agriculture has been a way of life and continues to be single most important livelihood of the masses. Agricultural policy focus in India across decades has been on self-sufficiency and self reliance in food grains production. Considerable progress has been made on food grains production that rose from 52 million tons in 1951-52 to 264.77 million tones in 2013-14. Its contribution to the national GDP has declined to 14.20 per cent due to high growth in industries and services sectors. Compared to other countries, India faces a greater challenge, since with only 2.30 per cent share in world's total land area; it has to ensure food security of its population which is about 17.50 per cent of world population. This leads to excessive pressure on land. Against the backdrop of the burgeoning population's demands for food grains, degrading natural resource base, emerging concerns of climate change and other challenges, the Department of Agriculture & Co-operation (DAC) has focused on mobilizing higher investment in agriculture for providing adequate support services to the farmers to make agriculture a remunerative vocation on a sustainable basis. Increasing agricultural production with limited natural resources in a sustainable manner for ensuring food and nutritional security and providing income security to farmers are the major challenges before the Government. Agriculture sector has touched a growth rate of 4.40 per cent in the second quarter of 2010-11 thereby achieving an overall growth rate of 3.80 per cent during the 1st half of 2010-11.

The agriculture sector of India records a GDP growth of 5.10 per cent in 2005-06, 4.20 per cent in 2006-07, 5.80 per cent in 2007-08, (-) 0.1 per cent in 2008-09 at 2004-05 prices. The low growth rate of 0.4 per cent recorded by this sector in 2009-10 was mainly due to poor rainfall in 2009. As per the estimation of central statistical organization for the year 2010-11, the agricultural sector contributed about 14.20 per cent to the GDP, at 2004-05 prices. There has been a continuous decline in the share of agriculture in the GDP from 17.40 per cent in 2006-07 to 14.20 per cent in 2010-11 as per advance estimates at 2004-05 prices. Falling share of agriculture in GDP is an expected outcome in a fast growing and changing economy.

As per the data given by the Ministry of Agriculture, Government of India total food grain production in India was 264.77 million tones (MTs) in 2013-14. The second advance estimates of food grains production has been given at 257.07 MTs for the year 2014-15. It comprised 106.54 MTs of rice, 95.91 MTs of wheat, 5.39 MTs of Jowar, 9.38 MTs of Bajra and 24.35 MTs of Maize (meant for the year 2013-14). Among pulse crops production figures of tur, gram, urad, moong and total pulses were 3.29 MTs, 9.88 MTs, 1.51 MTs, 1.50 MTs and 19.27 MTs respectively in the year 2013-14. As per 2nd advance estimates for the year 2014-15, a decline of 7.70 MTs (i.e., 2.91%) could be seen in regard to total food grains production. It was estimated at 257.07 MTs in 2014-15. *(Pratiyogita Darpan, Revised & Enlarged Edition, Indian Economy, 2015, p. 128).*

There has been an increase in input consumption of seeds, integrated Nutrient Management (INM), IPM and machinery components under rice, wheat, and pulses from 2007-08 to 2009-10 which indicates the awareness generated at the district level towards use of quality seeds, nutrients plant protection chemical and farm machinery. During 2008-09, nearly 50 per cent of the rice districts (70 out of 143), 33 per cent of the wheat districts (41 out of 138) and nearly 50 per cent of pulses districts 74 (out of 159) have recorded more than 10-20 per cent enhancement in productivity compared to the base year of 2006-07 *(Annual Report DoAC, MoA, GoI 2010-11, p. 34).*

6.1.2 Launching of National Food Security Mission

Agriculture is very challenging, today for Indian agriculture scientists confined to combat the challenge of deficit food availability in the country, the Government of India launched National Food Security Mission (NFSM) in 2007-08 at the beginning of 11th Five Year Plan with target to escalate production of rice, wheat and pulses by 10, 8 and 2 million tones respectively by the end of 11th Five Year Plan. The mission adopted two fold strategies to bridge the demand supply gap. First strategy was to expand area and the second was to bridge the productivity gap between potential and existing yield of food crops. Expansion of area approach was mainly confined to pulses and wheat only, and rice was mainly targeted for productivity enhancement.

The measures adopted to augment the productivity included (i) acceleration of quality seed production; (ii) emphasizing INM and IPM; (iii) promotion of new production technologies; (iv) supply of adequate and timely inputs; (v) popularizing improved farm implements; (vi) restoring soil fertility, and; (vii) introduction of pilot projects like community generator and blue bull. A total amount of Rs. 4,500 crores have been spent under NFSM during the 11th Five Year Plan (GoI, 2014).

As stated above, NFSM aimed to escalate production of rice, wheat and pulses by 10, 8 and 2 million tones, respectively by the end of 11th Five Year Plan. Generating employment opportunities was also a key objective. The NFSM target was to enhance farm profitability so that the farming community retains its confidence in farming activity. With these strategy and goals, NFSM was implemented in 561 districts in 27 states in the country (GoI, 2013). Along with the NFSM, RKVY programme was also launched during the same time period. In addition, there were several other state and Centrally Sponsored Programmes running parallel with the NFSM programme. Aided by all the above efforts of the Central and State governments, rice production during the end of 11th Five Year Plan increased by 12.1 million tones, wheat production by 19.1 million tones and pulses production by 3 million tones as compared to the production during the base year of 2006-07 (GoI, 2012). As per the progress report received from the states, significant achievements under NFSM have been recorded during last three years i.e., during 2007-08, 2008-09 and 2009-10. New farm practices have been encouraged through 3 lakhs demonstrations of improved package of practices. As many as 53,438 demonstrations of System of Rice Intensification (SRI) as well as 24,189 demonstration of hybrid rice have been conducted. Nearly, 85.79 lakh qtls of seeds of high yielding varieties of rice have been distributed. About 65.88 lakh hectares have been treated with soil ameliorants (gypsum/lime/micro-nutrients) to restore soil fertility. An area of about 25.77 lakh hectares has been treated under integrated pest management.

6.2 Background of NFSM in the State

The National Food Security Mission has been operating in 27 states of the country including Bihar. The National Food Security Mission comprising NFSM-rice, wheat and pulses during the 11th Five Year Plan. After successful achievement of targeted goal of production enhancement during 11th Five Year Plan coarse cereals are undertaken in 12th Five Year Plan under NFSM scheme and implemented in the state. The crop wise, district wise coverage under NFSM in Bihar during 11th Five Year Plan is presented in table below.

The National food security mission was launched in the state of Bihar in 2007-08 comprising NFSM-rice 18, wheat 25 and pulses 13 districts. Despite, there were some common districts in the state of Bihar comprising NFSM-rice and wheat in 15 common districts, NFSM-rice, wheat and pulses in 7 common district and NFSM-rice and pulses in 8 common districts are operating smooth fully.

6.3 Main Objectives and Scope of the Study

After completion of 11th Five Year Plan, National Food Security Mission is extended to 12th Five year Plan due to its successful achievement of the targeted goal of production enhancement. It is essential to evaluate and measure the extent to which the programme and approach has stood up to the expectation. The study would enlighten the policy makers to incorporate necessary corrective measures to make the programme more effective and successful during the 12th Five Year Plan. Given the above broad objectives, the study intends to achieve the following specific objectives listed below:

1. *To analyze the trends in area, production, productivity of rice, wheat and pulses in the selected NFSM and Non-NFSM districts in Bihar.*
2. *To analyze the socio-economic profile of NFSM vis-à-vis Non-NFSM beneficiary farmers of rice in Bihar.*
3. *To assess the impact of NFSM on input use, production and income among the beneficiary farmers in Bihar*
4. *To identify factors influencing the adoption of major interventions (improved technologies) under NFSM in the state of Bihar.*
5. *To identify the constraints hindering the performance of the programme in Bihar.*

6.4 Data and Methodology

The study is mainly based on the primary and secondary data. The secondary level data mainly confined to area, production and productivity of the crops were collected from various publications of Ministry of Agriculture (Government of India) and the Directorate of Agriculture, (Government of Bihar), related websites, research reports, papers and presentations.

The primary survey data were collected from selected sample farmers from two NFSM rice district of the state as presented in table 6.1. For the selection of farmers, a multi-stage sampling design was used and shown in (Fig. 1). At the first stage, two NFSM rice districts were selected. For the selection of district, crop production triennium average (TE) in the NFSM districts for the last three years period for which latest data were available and managed in descending order. Among the NFSM districts, the district having highest production and district having lowest production were selected for survey for selected crop. Accordingly, West Champaran and Madhepura districts were selected for primary data collection.

From each selected district, two blocks were selected at the 2nd stage, drawing one block from nearest district headquarter and 2nd at a distance of 15-20 km from the district headquarter. Accordingly, majhoulia and Bettiah block from west champaran; madhepura and murliganj block from madhepura district were selected.

Subsequently, at the third stage, 75 beneficiaries and 25 non-beneficiaries were selected randomly from each sample block making a total sample size 200 households per district and 400 households for rice crop in the state of Bihar. For the selection of beneficiary households from each block, the beneficiary list was obtained from district Agriculture office at block level. After obtaining the beneficiary list, the households were selected in such a way. That major components/covered under the scheme get due representation. For the selection of non-beneficiary households, there was no list available. Therefore, the selection of non-beneficiary households was done from same peripheral area so that similar cropping pattern and baseline characteristic are represented by the non-beneficiary households as well. Giving representation to different size classes and various socio-economic characteristics was also tried with the beneficiary and non-beneficiary sample farmers.

For fulfilling the first objective of the study analyzing the trends in production, productivity of rice, wheat and pulses in NFSM districts and Non-NFSM districts, secondary data on area, production and productivity of rice, wheat and pulses for 9th, 10th and 11th Five Year Plan is used. Average annual growth rate, correlation and graphical analysis were applied for this secondary information. For meeting the remaining objectives, primary household data were used. The primary data relating to general information about the sample farmers, socio-economic profiles, cropping pattern, details on various inputs used in rice crop cultivation, irrigation details, yields, returns, reasons for adoption/non-adoption of NFSM interventions, constrains faced for availing the benefits, suggestions for improvement, etc. were collected from the sample beneficiary and non-beneficiary farmers using a pre-tested questionnaire. The primary household data was collected (in October, 2014) mainly pertaining to agriculture year 2013-14.

6.5 Data Analysis

The year to year change in irrigated area, fertilizer use as well as growth in area, production and productivity of crops covered under NFSM during 11th Five Year Plan was calculated as given below:

Year to year change (YYC) = (CYV-PYV)/PYV x 100

Where, CYV = Current Year Value;

PYV = Previous Year Value

The data of the last year of previous plan was used for estimation of year to year change for the 1st year of the plan. The plan wise average annual growth rate (AAGR) was calculated by taking average of year to year change, as given below:

Where, AAGR indicate average of year to year change. The relation between percentage change in NFSM expenditure and percentage change in fertilizer consumption, irrigated area and production of paddy, wheat and pulses was analyzed by estimating correlation coefficient between two data sets. In order to know the factors influencing the participation of farmers in NFSM logistic regression using generalized linear model was used. The binary dependent variable was used as 1 for NFSM beneficiaries; 0 (zero) for non-beneficiary. The independent variables used for analysis were age, (year), education (code), total farming income (Rs/annum), caste (code), total number of people engaged in farming, net irrigated area (acre), asset value (Rs.), and credit amount borrowed (Rs/acre).

6.6 Impact of NFSM on Food grains Production in Bihar

- At the end of last three five years plan (9th to 11th Plan), net sown area in the state has declined from 73.21 lakh hectares in 1997-98 to 53.91 lakh hectares in 2011-12, whereas gross cropped area in the state has also declined from 98.33 lakh hectares in 1997-98 to 78.97 lakh hectares in 2001-02 may due to bifurcation of Bihar from Jharkhand in 2001-02.
- The per cent of gross irrigated area to gross cropped area in the state of Bihar was to be estimated at 66.17. The cropping intensity in the state has increased by 0.92 per cent marginally during 9th FYP, but it has decreased to 0.01 per cent during 10th Plan, while it increased 0.57 per cent during 11th FYP. Thereafter, the irrigation intensity has increased significantly 6.87 per cent during 9th Plan but it has decreased during 10th and 11th Plan.
- The consumption of fertilizer per hectare NSA had increased tremendously by 11.32 per cent per annum during the 10th Plan, while during 9th FYP period, the consumption of fertilizer had increased from 86.50 kg/ha of NSA in 1997-98 to 94.20 kg/ha of NSA in 2001-02 and the average annual growth rate for the period of 9th plan was 2.31 per cent. The average annual growth for the period of 11th plan was only 0.69 per cent which may due to adoption of organic farming and application of balance doses of the fertilizers in the state.
- The production of paddy and wheat have recorded significant growth during 10th as well as 11th FYP due to significant growth in productivity of paddy during that of same period, whereas production of paddy has recorded negative growth with declined in area under this crop during 9th FYP while, in case of pulses, production has recorded positively significant growth during 9th & 11th FYP due to increased in the productivity of same crop but that of same crop has recorded negatively significant per annum during 10th FYP due to declined in area and productivity under pulses crops.

- Average AGR at the end of 11th Plan was estimated to 64.66 per cent which indicates a positive sign of expenditure during 11th FYP under NFSM programme in the state of Bihar.
- Average AGR of amount released during 12 FYP was at the rate of 26.66 per cent per annum. While, that of amount expenditure during same plan was negatively significant at the rate of 35.11 per cent per annum. Despite availability of released amount under NFSM in Bihar, there was a decline in expenditures during the years of 12th Five Year Plan. So, a negative expenditure scenario is of evident.
- On an overall, there was positive correlation (0.72%) between NFSM expenditure and fertilizer consumption while, in case of net irrigated area, negative correlation between NFSM expenditure and net irrigated area was seen.

  Percentage change in area of paddy and wheat was positively correlated with change in expenditure under NFSM but production of same crops showed negatively correlated with change in NFSM expenditure, whereas change in production as well as area of pulses was highly correlated with NFSM expenditure but correlation between change in production was highly correlated with NFSM expenditure as compared to change in area under this crops.

6.7 Household Characteristics, Cropping Pattern and Production Structure

Some of the important point find out from above analysis as follows:

- The sample beneficiary households were relatively large in size, more dependence on agriculture with 1.52 times higher average holding size than sample non-beneficiary farmers.
- The average family size of beneficiary households was 7.38, whereas that was 6.25 in case of non-beneficiary households.
- The average size of operated land holding was 4.34 and 2.84 with regards to beneficiary and non-beneficiary households respectively. Both categories households were dominated by male respondents thus decisions were mostly taken by male head members.
- Only 66.58 per cent members of beneficiary households and 62.45 per cent members of non-beneficiary households were engaged in agriculture thus, the major source of income for both categories of households was agriculture.
- The social classification of selected beneficiary households indicate that the percentage of other backward classes was highest (54.68%) followed by general category households (33.02%) and lowest share was of SC category households (12.30%). Almost similar trend was found in case of non-beneficiaries. The percentages of OBC category of non-beneficiary respondents were (58.33) followed by general category (25%) and SC (16.68%).

- Only 77.75 per cent beneficiary holders which were marginal and small farmers together had hold largely 50.90 per cent area of total land holdings, whereas in case of non-beneficiary households, total 83 per cent small and marginal holders held together 42 per cent share in total land holding area.
- The average net operated land holding size was higher in beneficiary households (4.34 acre) than non-beneficiary (2.84 acre).
- About 75 per cent land of beneficiary households and about 68 per cent land of non-beneficiary households was irrigated and ground water was the main sources of irrigation for both the group.
- Only 42.65 per cent of leased-in was taken by beneficiary household on fixed rent on cash basis, followed by share cropping (36.21%) and fixed rent in kind (21.14%). The pattern of leasing-out of land was not followed by beneficiary households whereas the pattern of leasing-in of land was not followed by non-beneficiary households. In case of non-beneficiary households, fixed rent in cash pattern in leased-out land accounted for highest share (44.15%) in total land leased-out followed by share cropping (34.62%) and fixed rest in kind pattern (21.23%).
- The total food grain crops share in GCA was higher in case of beneficiary household than non beneficiary household. The paddy and wheat were the main cereal crops grown followed by maize and pulses.
- The net return per household as well as per acre of crop cultivation was higher in case of beneficiary household than non-beneficiary households.
- Average level of productivity of all cereal crops was recorded higher in beneficiary household than non beneficiary households.
- Availability of farm implements, machineries and equipments were relatively better with beneficiary households than non-beneficiary households.
- Out of the total selected beneficiary households, 46 per cent had taken loan, whereas in case of non-beneficiary, same was 60 per cent. The major source of credit was Commercial Bank (25.33%) among beneficiary households followed by PACS (19.33%) and money lender (1.34%), whereas in case of non-beneficiary household, major source of credit was PACS (32%) followed by Commercial Bank (25%) and money lenders (3%).
- The amounts of credit per household for agriculture purpose is concerned, NFSM beneficiary sample households were ahead Rs. 1,20,350/-, whereas in case of non-NFSM sample households, it was Rs. 1,05,650/-. In regard to other purposes under productive uses the quantums of credit were much higher in both the cases. It was more in case of non-NFSM households Rs. 3,55,210/- than the NFSM sample households Rs. 3,21,540/-.

6.8 NFSM Interventions and its Impact on Farming

The some of the major points emerged from this chapter after analyses are as below:

- Only 58.33 per cent beneficiary households were aware about the NFSM and 25.67 per cent farmers had availed the benefit without knowing about NFSM, while 16 per cent beneficiary households did not reply.
- Only 68.45 per cent beneficiary households had received information on NFSM from Agriculture department, followed by Newspaper (10.34%), Agriculture Exhibitions and Farmers/Friends (9.19%) and, also by KVK.
- The largest number of beneficiaries (52.67%) had availed the benefit of seed minikits of HYV/hybrid rice with demonstration, followed by benefit of conoweeder (34.67%), knap sack sprayer (24.33%), integrated nutrient management (18.33%), plant protection chemical (17.33%), integrated pest management (16%), pump set (16.67%) and incentive for micro nutrients (4.33%).
- 100 per cent subsidy benefit was availed by sample farmers under minikit seed distribution with field level demonstration. In the remaining others benefit item 50 per cent subsidy was availed by sample beneficiary households.
- Knap sack prayer was used by sample households only on their own field but not rented out while; other implements were used on their own farm as well as rented out.
- Sample farmers had not only benefited with subsidy amount for their own use but also earned extra money by renting out the implements.
- About half of the selected farmers had viewed that zero till seed drill helpful in timely operation followed by solved labour shortage (35.45%), weed control (26.34%), good plant growth (25.20%), increased cropping intensity (20.56%) and reduced drudgery.
- All the equipments of beneficiary households was found to be responsible in reduction of labour cost while zero till seed drill records maximum 6 per cent fall in labour cost followed by rotavator, machineries/tools, knap sack sprayer and pump set.
- Out of all implements mentioned in table 4.5, only knap sack sprayer and pump set was responsible for per cent reduction in losses after intervention with 2-4 per cent and 1-5 per cent respectively.
- All the implements mentioned in table 4-5 was responsible for percentage increase in the price of out-put because of better quality of seeds whereas pump set only more responsible for maximum 2-2.5% increase in the price of output followed by knap sack sprayer (1-2.5%), zero till seed drill (up to 4%) and machineries/tools by 3 per cent.

- More than 25 per cent of farmers had replied that use of zero till seed drill had impacted as improvement in soil health followed by knapsack sprayer, pump set, rotavator and machineries/tools with 20.35%, 18.45%, 12.60 and 7.55 per cent of sample respondents. Thereafter, there were no any respondent had viewed in favour of improvement in human health.
- The cost per quintal was higher Rs. 413.14 on non-NFSM farms than NFSM farms at Rs. 379.50, while gross income was comparatively higher on NFSM farm than Non-NFSM farms.
- The net income per acre was also higher on NFSM farms Rs. 10,994/- than non-NFSM farms Rs. 9,999.47. However, this clearly indicated that the impact of NFSM on paddy production was significant in the area of study.
- Only 48.25 per cent beneficiary household and 46.78 per cent non-beneficiary households had sold their output at local market, whereas more than 34 per cent of beneficiary households and 32.64 per cent of non beneficiary households had sold their produces at wholesale market, and remaining households of both beneficiary and non-beneficiary sample farmers had sold their output to the merchants.

6.9 Participation Decision, Constraints and Suggestions for Improvement of NFSM

- The respondent related to OBC having young age, more education, more number of families dependent on farming, more income from farming, more credit availed from different institutions and small holdings are likely to participate more in the NFSM.
- More than 78 per cent of the selected beneficiary farmers had the problem of arranging initial payment since subsidy would be after purchase Even if they arrange the initial money by some sources, the other problem was long time gap between the purchase and receiving the subsidy amount as mentioned by around (48 % of the sample beneficiary), poor quality of materials/machinery are supplied (26.48%), institutional financing facility not available under the programme (25.78%).
- More than 36 per cent of beneficiary households had suggested for improvement of irrigation facility whereas about 32 per cent beneficiary households told that insect-pest resistant varieties made available to the farmers on time.
- 34.28 per cent responses suggested that not political influence should be entertained in implementing the scheme whereas 26.50 per cent responses suggested that only needful farmers should be considered under the scheme. Also, some of responses (26.25%) say there should not any bias toward large farmer while about 17 per cent replied that good quality material should be supplied.

- 38 per cent farmers replied that they were unaware about the NFSM scheme, while 26.68 per cent farmers mentioned that scheme provides the inputs in limited quantity and not in time and therefore, they did not participate in the NFSM scheme. The other reason mentioned by non-beneficiary farmer was lower budget under scheme for subsidy. After that uncertainty in yield of improved varieties and costly inputs were other important reason among the sample farms since farmers did not participate in NFSM scheme.
- More than 68 per cent non-beneficiary households had suggested that the budget under NFSM scheme should be increased; about 49 per cent farmers replied that amount of subsidy should be increased, thereafter, more than 18 per cent farmers mentioned that special arrangement for training the farmers should be provided at local and village level and about 14 per cent farmers told that there should not any biasness toward large farmers.

6.10 Policy Implication:

Followings are the policy implication, which are based on field observation, discussions and field level data:

1. Under NFSM, SRI and SWI methods are followed in limited areas, which restrict the canvas of the programme, so there is need to expand it in a broader perspective with full awareness *(Attn: Ministry of Agriculture, Govt. of India).*

2. Since irrigation is a critical input today so extending irrigation facility to the farmers will be a great help to them and the agriculture as well. To pursue it, identification of beneficiaries and available traditional sources of irrigation for making it operational may be made at village/panchayat level for providing the benefits of scheme meant for irrigation to all fields *(Attn: Directorate of Agriculture, Govt. of Bihar).*

3. Remunerative prices to the produce should be ensured by strengthening of road & transport infrastructure *(Attn: Directorate of Agriculture, Government of Bihar).*

4. Subsidy component of the scheme should be hassle free and transparent *(Attn: Directorate of Agriculture, Government of Bihar).*

5. Field staff meant for technical back up, should be exclusively deployed, monitored and entrusted to obtain the feedback from the fields for its total solutions *(Directorate of Agriculture, Government of Bihar).*

6. Reporting system on coverage, production and yield should be factual and made punishable, if errors are detected and found abnormal and different *(Directorate of Agriculture, Government of Bihar).*

7. NFSM is a flagship programme for agriculture sector so it must implemented in letter and spirit to avoid the overlapping *(Directorate of Agriculture, Government of Bihar)*.
8. Availability of quality and ecology based inputs be ensured *(Directorate of Agriculture, Government of Bihar)*.
9. Distribution channels of inputs should be regularly and sincerely monitored for maintaining the timelines component because agricultural practices demand timeline *(Directorate of Agriculture, Government of Bihar)*.

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Annexure -I

Coordinator's Comments on the Draft Report

" Impact of National Food Security Mission (NFSM) on Input use, Production, Productivity and Income in Bihar"

Submitted by

Agro-Economic Research Centre for Bihar and Jharkhand, Bhagalpur

1. **Title of the draft report examined**

   Impact of National Food Security Mission (NFSM) on Input use, Production, Productivity and Income in Bihar

2. **Date of receipt of the Draft report**: 21st June 2015
3. **Date of dispatch of the comments**: July 14, 2015
4. **Comments on the Objectives of the study:**

   The objectives of the study have been fully addressed.

5. **Comments on the methodology:**

   The common methodology proposed for collection of primary data and tabulation of results has been followed.

6. **Comments on analysis, organization, presentation etc.**

   General remarks

   - **Chapter I:** Only district wise coverage is given for 11th Plan. Please insert Tables 1.1 and Table 1.2 which shows the year-wise, district-wise and crop-wise coverage of NFSM in Bihar for 11th and 12th plan as two different Tables 1.1 and 1.2 or Table 1.1a and Table 1.1b.
   - **Chapter II:** At some places comparison is done for different parameters for different period. For e.g. reduction of net sown area from the year 2001-02 to 2011-12 is compared with reduction in gross cropped area for the period from 1997-98 to 2001-02. In some discussion like fertilizer consumption is compared with per cent growth for 10th plan and in kg/ha for 11th plan. Please compare for same period with same unit. In Tables 2.4,2.5 and 2.6 the columns of area, production and yield for 9th FYP is left blank. If data is not

available, it may be mentioned in the beginning of discussion with reasons. If data is available, the columns have to filled-in.

Please re-check the estimated AAGR values in chapter II. The AAGR (average of year to year change) is estimated by using the formula: (current year- previous year)/previous year*100. Please consider the data of last year of previous plan for estimation of year to year change for the first year of the plan for which the AAGR is estimated. For instance (hypothetical example), AAGR is estimated for NIA data of 10th plan is estimated as follows:

	Years	Net Irrigated Area in '000' ha	AGR
Value pertains to previous plan period	2001-02	6640	
10th Plan	2002-03	6287	-5.31627
	2003-04	6753	7.41212
	2004-05	6794	0.607138
	2005-06	6729	-0.95673
	2006-07	6893	2.437212
Average Annual Growth Rate(AAGR)			0.836696

- **Chapters III**: (a) The figures are not consistent from one table to another. For example in Table 3.1, Rs. 98.67 thousands is shown as income of beneficiaries from only agriculture where as in Table 3.6 the amount showed under net returns is around Rs. 1.56 lakhs for beneficiaries. The figures in these two tables differ for non-beneficiary farmers also; (b) There are computational errors. For example: in Table 3.2, the formula for working out net operated area is cultivated area plus leased-in land minus Leased - out land. But leased-out land is also added (c) Decimals may be omitted while providing values in rupees; (d) In some tables absolute numbers are given. Instead of that, per cent to total sample would be better as followed by other states; (e) Wherever significant results are presented, discuss results with field experience gained during data collection and with existing literature relevant to results.

- **Chapters IV** : In Table 4.2 the first column providing absolute number of households may be deleted. In the same table: in subsidy as a per cent of cost column, provide only the per cent of subsidy in numbers and do not give it as 50% of Rs. 500 and like that. The other comments are in the file attached draft report.

- **Chapter V**, : Use relevant variables for logistic regression analysis (not necessarily the variable given in the table templates sent by us). Other comments are in the draft file itself.
- **Chapter VI:** The tables and charts presented in respective chapters need not be showed in this chapter. Several paragraphs are just repetition of what is written in previous five chapters. For instance: first four paragraphs of chapter I and first four paragraphs of chapter VI are same. There is ample scope to concise the chapter.
- To the extent possible please follow the chapter plan and table templates that was sent earlier. (A copy is attached with this letter)
- In discussion, please give per cents without zeros after decimal for e.g. 90.00 per cent may be written as 90 per cent
- More discussion on summaries, conclusions and policy suggestions on each chapter would benefit in drafting consolidated report.
- There is ample scope for correction of errors, improvement of the grammar and language. Hence proofread the report carefully before submitting to us and to ministry.

Specific remarks

- The specific comments / suggestions are provided in the draft report (word file) sent by you (attached). The file is sent as a commented file. You may send a separate file after incorporating all comments.

7. Overall view on acceptability of report

- The draft report can be accepted for consolidation and further submission to the ministry after it's been revised in accordance with the comments/suggestions. The soft copy of the revised report and excel data can be sent to us at the earliest as it helps in consolidating the state reports.

Annexure - II

Action Taken Report

1. Date of Draft report sent : June 20, 2015
2. Date of receipt of comments on Draft report : July 14, 2015
3. Date of dispatch of Final report : August 22, 2015
4. Comments attended as below, on the basis of **both** edit mode of the Draft Report and as per Annexure - I:

Chapter – I

K-1 Actual figure incorporated.
K-2 The referred document lacks quantification of seeds, so it is not possible to incorporate.
K-3 Source mentioned.
K-4 Shifted at proper place.
K-5 Suggestion addressed.

Chapter - II

K-6 Incorporated.
K-7 Incorporated.
K-8 Year mentioned.
K-9 Correction made.
K-10 Sentence re-constructed.
K-11 AAGR worked out as per the circulated formula (AAGR has been calculated based on average of four (04) values of the annual growth rate of each FYP excluding the value of the 1st year of the particular plan period.
K-12 Sentence restructured.
K-13 Triennium clarified.
K-14 Details are given in K-11.
K-15 Reason mentioned.
K-16 Addressed as at K-11.
K-17 Data are not available.
K-18 Data are not available.
K-19 Financial targets could not be available.
K-20 Reason mentioned.

Am-21, 22, 23 & 24 Value of first two rows and its correlation could not be done due to non availability of NFSM's expenditure data for initial two years. Actually the program was launched in the year 2007-08.

Chapter - III

K-25 Point discussed.

Am-26 Correction made.

K-27 Figures re-worked out and discussion accordingly changed.

K-28 Correction made.

K-29 Value rechecked.

Am-30 & Am-31 done as per suggestions.

K-32 Correction made.

K-33 This is meant for both beneficiary and non-beneficiary households.

K-34 Correction made.

K-35 Data in the table corrected and description accordingly changed.

K-36 Correction made.

K-37 Reasons incorporated.

K-38 Interpretation changed.

K-39 Correction made.

K-40 Interpretation changed accordingly.

Am-41 Correction made.

Chapter - IV

K-42 Correction not needed.

K-43 Correction made and description changed accordingly.

K-44 Column of absolute figures removed.

K-45 Correction made.

K-46 to K-48 Rectified accordingly.

Am-49 Table prepared as per the table design given.

Am-50 Correction made.

Am-51 Value of by product rechecked and change in description made.

Chapter - V

Am-52 Possible discussion added.

Chapter - VI

K-53 Section reduced, as suggested.

Rambalak Choudhary

Project Leader