EXECUTIVE SUMMARY

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).*

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.

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.

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.*

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.

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).

Concluding remarks

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.

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/-.

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.

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.

Policy Implications:

Followings are the policy implications, 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 *(Attn: 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 *(Attn: Directorate of Agriculture, Government of Bihar).*

8. Availability of quality and ecology based inputs be ensured *(Attn: 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 *(Attn: Directorate of Agriculture, Government of Bihar).*