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A Relevance and Distribution Efficiency of Seed Minikits of Pulses in Rajasthan

S. S. Kalamkar, H. Sharma & M. Ojha

All India Study Coordinated by
Agricultural Development and Rural Transformation Centre,
Institute for Social and Economic Change, Bangalore (Karnataka)

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Foreword

India plays a very important role by its contribution in world food production. It accounts for 10.24 percent of total world's total cereals production (rank third next to China and USA) and 21.75 percent of world's total pulses production (rank first) in 2016. India's size in terms of food consumers is also many times larger than the average size of the rest of the countries, except China, and accounts for 16.7 percent of the world's food consumers. Another important dimension of food security in India is that a large number of rural households in India are food grain producers, a fact which has got positive implications for food access. Food and nutrition security has remained one of the top priorities of policy planners in post-Independence India. Improving the food security is an issue of considerable importance for the developing countries like India where millions of people suffer from hunger and malnutrition. Due to deep-rooted poverty, rapidly growing population, low agricultural productivity and resultant food and nutritional insecurity during early independence periods, country had to give high priority to make our population food secure which would in turn mean economic growth and reduce poverty. India made significant advances towards achieving its goals of rapid agricultural growth, improving food security, and reducing rural poverty during last four decades. The introduction of Borlaug new seed-fertilizer technology during the mid sixties led to large increases in the yield levels of wheat, rice and later oilseeds and cotton. Food grains production has increased more than five times from 50.82 million tonnes (mt) in 1950-51 to about 291.95 mt in 2019-20. However, despite the impressive growth and development, India is still home to the largest number of poor people of the world and accounts for about one-fifth of the world' poor. Rural poverty and food insecurity at household level remain pronounced, despite pervasive government interventions. Food availability and price stability, which are considered as a good measure of food security till 1970, were achieved through green revolution and Public Distribution System (PDS), however the chronic food security which is primary associated with poverty, still persisted in the country. In addition to this, per capita per day availability of food grains in India is almost stagnant during last decade. In order to combat the challenge of deficit food availability in the country, the Government of India launched National Food Security Mission (NFSM) in 2007-08 with an objective to escalate production of rice, wheat and pulses by 10, 8, and 2 million tonnes, respectively by the end of 11^{TH} FYP. After achieving the goal of increasing foodgrains production by 20 million tonnes during XI^{th} Plan period, new targets have been set to produce additional 25 million tonnes of foodgrains by 2016-17. 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.

NFSM-Pulses is one of the components of the centrally sponsored scheme of NFSM and is under implementation since *Rabi* 2007-08. This component has undergone a number of changes since its inception and finally has taken the shape

of sole centrally sponsored scheme on pulses. Accelerated Pulses Production Programme (under NFSM) is another step forward for vigorous implementation of the pulse development under the NFSM-Pulses. The latest released / pre-release varieties/ hybrids not older than 10 years are popularized through distribution of seed minikits free of cost to the farmers. The required leaflets on cultural practices are to be kept in the seed Minikits along with Rhizobium / PSB culture wherever it is required in the respective seed packet of Minikits. The purpose is to ensure, that the identified farmer is capable of raising the crop with care & diligence such that the plot serves as a good demonstration to other farmers. As the programme is under progress for last three to four years, it is required to see the various aspects of implementation of this programme. How efficiently the distribution of seeds is taking place. It is required to check whether the scheme is relevant and useful from the viewpoint of farmers. It is also important to examine whether seed minikits have any significant impact on productivity and how much area is being cropped under such seeds. With this view, the Directorate of Economic and Statistics, Ministry of Agriculture, Government of India assigned us a study on *"*A Relevance and Distribution Efficiency of Seed Minikits of Pulses in Rajasthan*"*. Agricultural Development and Rural Transformation Centre, Institute for Social and Economic Change, Bangalore, Karnataka has coordinated this all India study.

The study is based on secondary and primary level data. The primary survey data were obtained for the agriculture year 2019-20 from total 300 selected pulse growers from two districts (Bundi and Nagaur) of Rajasthan State. The results of study show that seed minikit programme has helped the selected farmers in raising their crop yield and income from crop cultivation. On the basis of the findings, relevant policy suggestions have been made.

I am thankful to authors and their research team for putting in a lot of efforts to complete this excellent piece of work. I also thank the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India for the unstinted cooperation and support. I hope this report will be useful for those who are interested in understanding the seed minikit programme in Rajasthan.

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We have benefited immensely from various scholars and officials from different government departments while carrying out this study. At the outset, we would like to thank **Prof. Shirish Kulkarni**, Vice Chancellor of our University and Chairman, AERC Governing Body as well as Dr. Mahesh Pathak, former Honorary Advisor of our Centre for their constant encouragement and support for undertaking such research activity at the Centre.

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We thank Commissioner of Agriculture, Govt. of Rajasthan, Jaipur and State Programme Implementation Officer at State as well as selected district levels for providing the secondary level information related to distribution of cropwise year wise seed minikit distribution in the state of Rajasthan.

The study would not have reached to this stage without the active co-operation of the respondent pulse producers from selected district /villages in Rajasthan who provided all the required data for the study without any hesitation and expectation. We thank each one of them for their invaluable support.

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List of Abbreviations

A		Area
AFCL		Agricultural Finance Corporation Limited
AGR		Annual Growth Rate
Av.		Average
CAGR		Compound Annual Growth Rate
FAO		Food and Agriculture Organization
GCA		Gross Cropped Area
GDP		Gross Domestic Product
GOI		Government of India
GOR		Government of Rajasthan
GSDP		Gross State Domestic Product
ha		Hectare
HH/hh		Household
HIL		Hindustan Insecticides Limited
IFAD		International Fund for Agricultural Development
IFFCO		Indian Farmers Fertilizer Co-operative Ltd.
IFFDC		Indian Farm Forestry Development Co-operative Limited
IFPRI		International Food Policy Research Institute
INM		Integrated Nutrient Management
IPM		Integrated Pest Management
ISOPOM		Integrated Scheme on Oilseeds, Pulses, Oil palm and Maize
kg		kilograms
KRIBHCO		Krishak Bharti Co-operative Ltd
mha		Million hectares
mt		Metric Tonnes
NA		Not Available
NAFED		National Agriculture Marketing Federation Ltd
NCA		Net Cropped Area
NFHS		National Family Health Survey
NFSM		National Food Security Mission
NHM		National Horticultural Mission
NIA		Net Irrigated Area
NPK		Nitrogen (N), Phosphorus (P), and Potassium (K)
NOA		Net Operated Area
NSA		Net Sown Area
NSC		National Seed Corporation
NSDP		Net State Domestic Product
NSS		National Sample Survey
OBC		Other Backward Classes
P		Production
PPP	-	Purchase Power Parity
PDS		Public Distribution System
RKVY		Rashtriya Krishi Vikas Yojana
SC		Scheduled Caste
ST		Scheduled Tribe
TE		Triennium Endings
USA		United States of America
Y		Yield

Executive Summary

A Relevance and Distribution Efficiency of Seed Minikits of Pulses in Rajasthan

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1. Introduction:

India plays a very important role by its contribution in world food production. It accounts for 10.24 percent of total world's total cereals production (rank third next to China and USA) and 21.75 percent of world's total pulses production (rank first) in 2016. India's size in terms of food consumers is also many times larger than the average size of the rest of the countries, except China, and accounts for 16.7 percent of the world's food consumers. Another important dimension of food security in India is that a large number of rural households in India are food grain producers, a fact which has got positive implications for food access. India has made significant advances towards achieving its goals of rapid agricultural growth, improving food security, and reducing rural poverty during last six decades. Food grains production has increased more than five times from 50.82 million tonnes (mt) in 1950-51 to about 291.95 mt in 2019-20. Except first decade when production growth was mostly driven by area growth, yield growth was instrumental in increase in production of food grains during all other decades. The stagnant growth of food grains production during 1990-01 to 2006-07 was partly contributed by the stagnant if not declining in area but largely by the decline or stagnant yield rate. Nevertheless, there have been signs of improvement during the recent years, specifically after 2007-08. The significant and reverse turn in agricultural production occurred mainly due to the implementation of important programs, such as Rashtriya Krishi Vikas Yojana, National Food Security Mission, National Horticultural Mission (NHM), various sub-schemes and substantial increase in the state agricultural outlay on agriculture.

Pulses are an important commodity group of crops that provide high quality protein complementing cereal proteins for pre-dominantly substantial vegetarian population of the country. Probably no other country as like India produces and costumes as varied array of pulses. India is global leader in terms of production and consumption of pulses. India is leading importer of pulses because production of pulse/ legume crops has been stagnant over the years although situation has slightly changed in the recent past. Consequent upon this, there is widening gap between demand and supply/availability of Pulses. About 20 per cent of the total pulses demand is met by imports only. Although this crop group is more important from the nutritional point of view, there has not any significant increase in area and production as well as per capita availability during 1953-54 to 2009-10, however, significant growth in area and production has been recorded during the last ten years (i.e. 2010-2011 to 2019-20), in which area growth was instrumental followed by yield improvement.

With the increase in infrastructural and irrigation facilities/resources, the pulses get the marginalized treatment pushing them to another poor and marginal land piece. The technical change in pulse crops is also slow compared to superior cereals and other cash crops as it compete with resources, research and infrastructure. The share of area under pulses in total food grains was recorded the highest in 2017-18 (23.5 per cent), while share of pulses production in total food grains production was estimated to be 8.9 per cent in 2017-18 which was much lower that share of around 17 per cent recorded during 1950-1960. While during TE 2006-07 to TE 2016-17, the production of pulses had increased by 39 per cent, mainly due to significant increase in productivity growth (22 per cent) with support of area growth by 14 per cent over base year. The per capita availability of pulses per day has increased to 494.1

gram in 2018 from 436 gram per day in 2006, which is still lower than record availability of 510 gram/day in 1991.

NFSM-Pulses is one of the components of the centrally sponsored scheme of NFSM and is under implementation since Rabi 2007-08. This component has undergone a number of changes since its inception and finally has taken the shape of sole centrally sponsored scheme on pulses. Accelerated Pulses Production Programme (under NFSM) is another step forward for vigorous implementation of the pulse development under the NFSM-Pulses. Seed Mini-kits are meant for introduction and popularization of latest released /pre released varieties /hybrids not older than 10 years among the farmers free of cost. National and state seed producing agencies supply minikits to State Government for distribution amongst farmers. Allocation of minikits is made to all farmers in contiguous area of at least 25 hectares. The size of minikits is 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong, urad and pigeon pea. This quantity is sufficient to plant 0.2 ha. In addition, under this package, some state governments (Karnataka) is also providing, a pamphlet regarding package of practice (POP) and phosphate solubilizing bacteria (PSB) culture of 100 grams per packet per mini kit to pulse farmers.

Madhya Pradesh accounts for the one forth of area and almost one third of production of pulses of our country. Rajasthan is the second largest producer of the pulses accounting around 13 per cent in national pulses production with about 18 per cent share in area. almost two third pulses production in rabi season and rest in kharif season. Gram accounted the highest share of about 45 per cent in total pulses production followed by Tur (around 17 per cent) and Urad (14 per cent). The Statewise distribution of seed minikits together during two years period (2016-17 and 2017-18) indicate that Rajasthan, Uttar Pradesh, Andhra Pradesh and Madhya Pradesh together accounts for 52 per cent of total seed distributed. The seed distribution agencies were NSC, NAFED, HIL, KRIBHCO and IFFDC.

2. Need for and Objectives of the Study

The latest released / pre-release varieties/ hybrids not older than 10 years are popularized through distribution of seed minikits free of cost to the farmers. The required leaflets on cultural practices are to be kept in the seed Minikits along with Rhizobium / PSB culture wherever it is required in the respective seed packet of Minikits. The purpose is to ensure, that the identified farmer is capable of raising the crop with care & diligence such that the plot serves as a good demonstration to other farmers. As the programme is under progress for last three to four years, it is required to see the various aspects of implementation of this programme. How efficiently the distribution of seeds is taking place. We need to check whether the scheme is relevant and useful from the viewpoint of farmers. It is also important to examine whether seed minikits have any significant impact on productivity and how much area is being cropped under such seeds. Therefore, keeping the importance in mind, the present study is proposed to examine the need, application, pertinence and efficiency in distribution of seed minikits. The NFSM is extended to 12th Five Year Plan due to its success in achieving 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 expectations. The study enlightens the policy makers to incorporate necessary corrections to make the programme more effective and successful.

3. Data and Methodology

The study is based on secondary and primary level data. The secondary data on area, production and productivity of pulse crops and related parameters were collected from various published sources. The primary data were collected from the state of Rajasthan. For the selection of sample in each state, two districts were selected, one irrigated and one dry

land based on highest seed minikits distributed during the reference period of 2017-18 and 2018-19. Accordingly, Bundi (irrigated) and Naguar (Rainfed) district were selected. From each selected district, a sample of 100 seed minikit beneficiary farmers and 50 control group pulse growing farmers were selected using random sampling method. In this way a total number of 200 beneficiaries and 100 non beneficiaries were selected in Rajasthan state. Lentil and Urad seed minikits beneficiaries were selected from Bundi district and Gram and Moong beneficiaries were selected from Naguar district.

Table 1: Selected districts in Rajasthan

Sr. No.	Crops (Season)	Bundi			Naguar		
		Beneficiary	Non Beneficiary	Total	Beneficiary	Non Beneficiary	Total
A	Urad (kharif)	40	20	60	-	-	-
B	Moong (kharif)	-	-	-	88	47	135
C	Gram (Rabi)	-	-	-	12	03	15
D	Lentil (Rabi)	60	30	90	-	-	-
	All Total	100	50	150	100	50	150

3. Main Findings from Secondary data

- Rajasthan State accounts for about 6.9 per cent of total food grains production of country during 2017-18 from 14.24 mha area having 11.16 per cent share in national coverage under foodgrains. It is important to note the low coverage of food grains under irrigation in Rajasthan (35.9 per cent) as compared to 53.1 per cent of area coverage under irrigation at national level (2014-15). In case of pulses production, state of Rajasthan holds second position after Madhya Pradesh and accounts for 13.4 per cent in total national pulses stock having 17.8 per cent of national area under pulses (5.33 mha), while lower area under coverage (21 per cent) resulted in low level of productivity of pulses of 635 kg/ha as compared to 841 kg/ha at national level.
- The share of the cultivable area to total geographical area was about 75 per cent which is almost same during the two period points, i.e. TE 2006-7 and TE 2016-17. While share of the area under pulses to total cultivable area has increased from 13.4 per cent to almost 17 per cent during the corresponding two period points. Thus over the period of one decade, area under pulses has increased by 3.6 per cent points. Bundi, Pali, Ajmer and Tonk district has registered the significant increase in share of area under pulses to cultivable area during two points period.
- Nagaur district is the largest producer of pulses (12.41%) followed Bikaner (11.61%), Churu (7.49%), Ajmer (6.55%), Pali and Jaipur (6 % each), while Bundi contributes about 3 per cent share in state pulses production during 2016-17.
- The three top most districts having more than 11 per cent share each in total area at the State are Churu (14.3%), Nagaur (12.4%) and Bikaner (11.3%). The data on district-wise share in area under pulses at district gross cropped area indicate that five topmost pulses growing districts were Churu having about 56 per cent of gross cropped area under pulses, followed by Nagaur (43 per cent), Ajmer (40%), Pali (40%) and Bikaner (35%).
- During kharif seasons, two pulse crop minikits viz. Green gram and Black Gram were distributed to the farmers under this scheme. The highest number of minikits of both kharif pulse crops together for both years were distributed in Nagaur district (22.3% of total minikits) followed by Ajmer (8.42%), Jodhapur (8.23%), Jaipur (8.18%), Pali (7.71%), Tonk (6.38%), and Jalore (6.18%). These seven districts accounts for two third of seed minikits distributed of moog and urad together.
- While in case of rabi pulses (Bengal Gram and Lentil), the highest number of minikits of both rabi pulse crops together for both years were distributed in Bundi district (13.35% of total minikits) followed by Bhilwara 7.95%), Bharatpur (7.21%), Bikaner (7.10%), Tonk

(6.78%), Sikar (6.68%), and Pratagarh (6.09%). These seven districts accounts for 55 per cent of total seed minikits distributed.

Table 2: District wise Production and Yield of Pulses Crop Area in Rajasthan (2016-17)

Sr. No.	District	Area		Production		Yield
		ha	% to total	tonnes	% to total	(kg/ha)
1	Ajmer	288470	5.02	223848	6.55	776
2	Alwar	13494	0.23	19706	0.58	1460
3	Banswara	26818	0.47	23870	0.70	890
4	Baran	58012	1.01	58515	1.71	1009
5	Barmer	331394	5.77	32577	0.95	98
6	Bharatpur	5540	0.10	6843	0.20	1235
7	Bhilwara	143237	2.49	98925	2.89	691
8	Bikaner	651351	11.34	396747	11.61	609
9	Bundi	130977	2.28	99470	2.91	759
10	Chittorgarh	17055	0.30	15172	0.44	890
11	Churu	821843	14.30	255968	7.49	311
12	Dausa	14893	0.26	21990	0.64	1477
13	Dholpur	1973	0.03	2072	0.06	1050
14	Dungarpur	25363	0.44	23923	0.70	943
15	Ganganagar	180762	3.15	146083	4.27	808
16	Hanumangarh	255864	4.45	130943	3.83	512
17	Jaipur	227532	3.96	205994	6.03	905
18	Jaisalmer	211077	3.67	157656	4.61	747
19	Jalore	156803	2.73	65276	1.91	416
20	Jhalawar	69295	1.21	61567	1.80	888
21	Jhunjhunu	144965	2.52	129889	3.80	896
22	Jodhpur	406565	7.08	168451	4.93	414
23	Karauli	9197	0.16	14025	0.41	1525
24	Kota	57015	0.99	54247	1.59	951
25	Nagaur	710530	12.37	424153	12.41	597
26	Pali	354922	6.18	207753	6.08	585
27	Pratapgarh	28751	0.50	38530	1.13	1340
28	Rajsamand	3121	0.05	2242	0.07	718
29	Sawai Madhopur	49045	0.85	53215	1.56	1085
30	Sikar	120659	2.10	106815	3.12	885
31	Sirohi	15711	0.27	7900	0.23	503
32	Tonk	191694	3.34	143934	4.21	751
33	Udaipur	21634	0.38	20399	0.60	943
	Raj State	5745562	100.00	3418698	100.00	595

4. Main Findings from Field Survey data

- The average size of the household was estimated to be 6 persons, while marginal land group households found to be the smallest (5.63) and the large group land holders had the largest family size (6.68).
- As per the specification and selection of beneficiary of the scheme (women criteria), three forth of the total respondents were women. The age range of more than 80 per cent of total selected household respondent was 30-60 years while around 9 per cent were from young group (less than 30 years) and rest were from above 60 age group (11%), while across the groups, near about same trend was observed.
- In case of education status, majority of the respondents were found to be to be illiterate (56.67%). Around one third of the total household respondents were educated mostly up to the SSC level. This indicate the lower education status of the respondents in Rajasthan in general, women in particular. Around 60 percent of total family members were engaged in farming and average farming experience was estimated to be about 25 years.
- At overall level, about 49 per cent households were from other backward classes group followed by about 38 per cent from SC, about 10 percent from ST and rest were from

open category. Among the selected marginal land holders group, about 69 per cent households together belonged to SC and ST category.

- Majority of households have agriculture as a main occupation while agriculture labour and allied was subsidiary occupation. The average income from agriculture and allied activities is recorded to be Rs. 118383/- while same was Rs. 35597/- from non-agricultural sources.
- The average operational land holding of the selected household was about 6.11 acre having 40 percent land under irrigation (net) at overall level. Across land size groups, 71 percent of land of marginal farmers was under irrigation, followed by 45 per cent land of small, 41 per cent land of medium and 29 per cent of land of large farm group has irrigation facility. Thus, more the land, less the area under irrigated and vice versa. Same the case of cropping intensity wherein highest cropping intensity was recorded by marginal farmers and the lowest was in case of large farmer, with average cropping intensity of 138 per cent.
- The average rental value of land was observed to be Rs. 6000/- for irrigated land in Bundi district while Rs. 2500/- per acre in rainfed areas of Naguar district. While most of land leased in land was on share cropping basis.
- The topmost source of the irrigation was groundwater (dug-well and bore-well) irrigating more than 80 per cent of total irrigated land at overall level. The average water charges rates prevailing in the study area was Rs. 3125/- per acre water.
- The marginal farmers had more than 81 per cent of total land under irrigation followed by small, medium and large farm size category farmers with 53 per cent of total gross cropped area was under irrigation. At overall level, one fifth of cropped area was under irrigation covered by pulses crops, while across land size groups, same was highest in marginal group (35 percent) and the lowest was in large size farm group (9 per cent). Under rainfed condition, 30 per cent of total cropped area was under pulses of which moong was major pulse crop.
- At overall level, the major crops grown by the selected households were mung, urad,bajra, rapeseed mustard, wheat and gram. Pulse crops accounted for half of the cropped area of the selected households. The share of rainfed pulse area in gross cropped area was around 30 per cent while same was around 20 per cent irrigated land holders. Oilseed crops were mostly grown by the irrigated land holders.
- The value of output, cost and net returns by the farm size of selected households indicate that production per acre of all crops on average was reported to be the highest in case of marginal farmers and the lowest yield rate was realised by large farmer group. While among rainfed and irrigated condition crop production, marginal farmers have realised highest crop yield, however, large farmers group recorded highest yield under rainfed condition. The value of main output and cost of production per acre was estimated to be highest in case of marginal farmers and the lowest in case of medium group farmers. The net return realised by the selected farmer households was recorded to be highest for marginal land holders and lowest for large size land holders. Thus, it has been proved again that the marginal farmers reap the highest yield as well as returns, which may be due to small size of holdings and more involvement of family labours in crop cultivation. While gross farm income per household as expected was the highest in large land size group and lowest was in marginal size group.
- It was observed that on an average, in all four selected pulse crops, cost of cultivation per acre of beneficiary households was estimated to be lower than the non-beneficiary households, must be because of lower cost of seed to some extent (due to partial share of seed minikit). While net returns per acre was reported higher in beneficiary group in cultivation of black gram and green gram only. Thus, kharif pulse crops cultivation found to be more profitable for beneficiary farmers than non-beneficiary farmers. Despite of the fact that quality seed was provided through seed minikits program, not much improvement in productivity level of these selected crops is reported by beneficiary farmers. While at overall level, almost 12 percent of total lentil beneficiary farmers had

reported crop failure (with level of production less than 1 quintal/acre), of which largest share was of marginal lentil farmers whose income was severally affected. Also around 13 per cent of total urad beneficiary farmers and 40 per cent non beneficiary urad farmers reported crop failure wherein share of medium farmers from beneficiary group while marginal and small farmers from non-beneficiary group was the highest.

- Rainfed pulse crops grown by the farmers in Naguar district (green gram (kharif season) and gram (rabi season)) were relatively more stable in crop productivity (except one case in gram of large land holder). As mentioned in Chapter I, the crop failure was the main problem in estimation of value of output and net returns. Around 18 per cent of beneficiary households and 8 per cent of non beneficiary households at overall level had realised production less than one quintal in acre of which some of them did not reap any harvest. The productivity level of kharif pulse crops grown by beneficiary farmers was marginally higher than that of non-beneficiary group, while opposite the case of rabi crops where higher productivity was reported by non-beneficiary group. Purchase of the green gram by the government at minimum support prices in Naguar district has helped the farmers to recover the cost of production and profit margin on crop cultivation.
- The per quintal cost of production of kharif crops (mung and urad) was estimated lower in case of beneficiary farmers (Rs. 3382 and Rs. 2060/- per quintal) than non-beneficiary farmers while opposite picture was estimated in case of rabi crops (lentil and gram). The net price received (for main produce in market/village) by the farmers across the group of farmers was almost same in all crops, which ranges from Rs.3400-5000 per quintal in lentil, Rs. 2700-5000 per quintal in urad, Rs. 4000-6975 per quintal in case of mung and Rs. 4200 -5000 per quintal in case of gram. Thus, on an average, selected farmers have realised the net return of Rs. 9000-10000 per acre in cultivation of pulse crops. However, not much effect of seed minikit was reported as supplied quantity was much less than requirement and thus, farmers had to procured seed from the market or other sources.
- The three operations together (harvesting and threshing, labor and land preparation) accounts for around 78 per cent of total cost of cultivation of Black gram and Green gram, while in case of lentil, corresponding figure was 70-72 percent. In case of bengal gram, low harvesting cost by non beneficiary farmers put total to around 51 per cent as compared to 75 percent share reported by beneficiary farmers. Higher seed share in cost of cultivation was reported by non-beneficiary households than its counterpart.
- The labour use of pattern of the selected sample households indicate that the major labour using activities were weeding, sowing, application of plant protection, fertiliser and manures, and bagging, which accounted for the major share in labour use, which was relatively higher in case of non-beneficiary households than beneficiary households.
- As labour operations like land preparation, harvesting and threshing were done by using machine labour and therefore human labour use was reported to be lower. While all the sowing was done by adopting line sowing method.
- The minikits were distributed only through agriculture department by following the stipulated procedure of selection and distribution of minikits.
- Adhaar card was the main and only document was produced by the sample beneficiary for availing the benefit and used by the issuing authority to validate the claim as beneficiary.
- The highest share was of women beneficiary in total followed by the beneficiary from small and marginal famers and then from SC/ST category.
- The subsidies rate of the seed minikit was Rs. 184 per kit of Bengal gram (16 kg), Rs. 45 per kit of Green gram (4 kg) ; Rs. 50 per each kit of lentil (8 kg) and Black gram (4 kg). No amount was reimbursed as amount charged was token amount from farmers which must be 10 per cent of total cost of seed.
- All the selected households had received the information about the seed minikit programme from the agriculture officer of the taluk/district and none of the other source of information was reported.

- The size of minikits was 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong and urad. This quantity is sufficient to plant 0.2 ha. While area covered under particular pulse and oilseed crop was reported to be more than same which indicate farmers have used the home grown retained or seed purchased from market or from villagers have used. Thus, seed provided in inadequate in nature and need to scale up the quantity of seed.
- Some farmers have retained the seeds for next sowing season.
- The selected farmers households did not receive the any other seed minikit of any other crop.
- With seed minikit, no other input such as fertiliser or any culture was provided.
- The two main channels for marketing of pulses utilised by the selected famers were sale to merchant or prearranged contract and sell at APMC market.
- All sample household opined that seed distribution programme is advantageous and noted the yield and quality difference in same.
- However, all of them were also opined that seed distributed was insufficient and at least seed should cover 0.32 ha (0.79 acre) area compared to 0.2 ha (0.49 acre) under present scheme
- Also, most of the selected households were satisfied with the quality of seed provided to them and timely distribution of same.
- The major problem faced by farmers in availing the seed minikit was less quantity of seed minikit.
- In order to overcome these problems, sample households have given suggestions, such as more supply of seed, suitable variety suitable to local condition and seed should be given to all farmers.
- While survey, it was reported that no demonstration/ training was given to selected beneficiary households on how to use the minikit as well as on package of practises

4. Conclusion and Policy Suggestions

The seed distribution programme has found to be advantageous in terms of availability of cheap seed. However, seed distributed was insufficient quantity as well not much difference in productivity was reported. The policy implications emerged out of the study is as follows:

- The government should ensure timely availability of adequate quantity of quality seed by taking into account the actual requirement of seed in particular area.
- Bottom-up approach should be used in implementation of the scheme.
- Seed minikits should be provided only to farmers those have attended the training on same. Demonstration should be given before distributing the Seed minikit
- State Agriculture Universities should try to develop the seed varieties suitable to local conditions.
- The awareness level about the scheme and need of Seed Replacement Rate needs to increased/raised through agricultural extensions programmes.
- Procurement of output by Government Agencies would certainly help in increasing area under pulses.

Chapter I
Introduction

1.1 Introduction

Agriculture continues to be an important sector of Indian economy because of its strategic importance to food and nutritional security, employment generation and poverty reduction, despite a significant decline in its share in the gross value added which was around 16 cent in 2018-19 (at current prices) (GOI, 2019). In fact, among the ten major sectors of Indian economy, the contribution of agriculture is the highest, both in employment as well as in value added output. The sector still engages more than half of the country's labour force (54.6 % of total employment as per Census 2011, GOI, 2011), provides raw material for a large number of industries, contribute 12.86 per cent in national exports (in 2017-18) and is a significant, if not the sole, source of livelihood for the smallholders (< 2 ha) who comprise about 86 per cent of total number of farm holders during 2015-16 (GOI, 2019). While the future of India's food security rests on small farms, the land-based livelihoods are becoming untenable for the majority of smallholders not only because of their limited scale but also due to a number of constraints, such as poor access to markets, inputs, technologies, information and services, they face in their endeavour to enhance farm incomes. Therefore, decent agricultural growth is a pre-requisite for providing food and nutrition security to burgeoning population of more than 1.3 billion in the country.

The global food and nutrition security is in question today with ever-increasing food prices resulting from adverse climatic effects on agricultural production, rise in oil prices, increasing use of grains for biofuels, and relatively less public spending on agricultural sector over the last three decades. At the same time, world has experienced an unprecedented increase in population during the past century, with a billion people added every decade during the last three decades alone. Thus, changes in food availability, rising commodity prices and new producer–consumer linkages have crucial implications for the livelihoods of poor and food-insecure people (Braun, 2007). In fact, global food prices witnessed

a very sharp increase in 2007 and they continue to rise. Initially it was thought that the increase in food prices was a part of their cyclical nature, aggravated by the adverse impact of weather on production in some parts of the world. However, the continuing surge and the high level of global food prices seen so far till 2008 make it abundantly clear that the recent trend cannot be attributed to any volatility of international prices and there are fears that food prices may stay at these levels or may rise even further. The increase has been particularly very sharp for staple foods. During 2007-2011, two rounds of food price hikes have contributed to millions of people being hungry or malnourished (IFPRI, 2011). These increases in prices of staple foods have led to emergencies and rationing in a large number of countries and there are frequent reports of food riots from various parts of the globe (Chand, 2008), particularly in under-developed and developing countries, and the picture is turning gloomier day by day. This is causing worldwide concern.

India plays a very important role by its contribution in world food production. It accounts for 10.24 percent of total world's total cereals production (rank third next to China and USA) and 21.75 percent of world's total pulses production (rank first) in 2016 (GOI, 2019). India's size in terms of food consumers is also many times larger than the average size of the rest of the countries, except China (Acharya, 2007), and accounts for 16.7 percent of the world's food consumers. Another important dimension of food security in India is that a large number of rural households in India are food grain producers, a fact which has got positive implications for food access (Kalamkar, 2011 and 2011a).

Food and nutrition security has remained one of the top priorities of policy planners in post-Independence India. Improving the food security is an issue of considerable importance for the developing countries like India where millions of people suffer from hunger and malnutrition. Due to deep-rooted poverty, rapidly growing population, low agricultural productivity and resultant food and nutritional insecurity during early independence periods, country had to give high priority to make our population food secure which would in turn mean economic growth and reduce poverty. India made significant advances towards achieving its goals of rapid agricultural growth, improving food security, and reducing rural poverty during last four decades. The introduction of Borlaug new seed-fertilizer

technology during the mid sixties led to large increases in the yield levels of wheat, rice and later commercial crops like oilseeds and cotton (Bhalla, 2007). Food grains production has increased more than 5.7 times during last seven decades, i.e. from 50.82 million tonnes (mt) in 1950-51 to about 291.95 mt in 2019-20 (see, Table 1.1). The increase in the food grains production was mainly resulted from increase in yield rather than expansion of cultivated area under food grains, which remain stagnant at around 126 million hectares since last four decades (since 1973-74). The country has followed a multi-pronged strategy to improve and sustain food and nutrition security. The strategy includes (i) strong support for raising food production, (ii) stable supply of some food staples and (iii) making food available at affordable prices. This strategy embraces several instruments that cover generation and adoption of technology, better availability of inputs, institutional credit, subsidy on farm inputs, improved infrastructure, expansion of irrigation, institutional reforms and mechanism, competitive markets, remunerative prices for farmers/producers, public procurement, system of buffer stocks, open market sales, supply of food through public distribution system, nutrition interventions and trade policy (Chand and Jumrani, 2013).

Table 1.1: Production of Food grains in India (1950-51 to 2019-20)

Period	Cereals (million tonnes- mt)				Pulses (mt)	Food grains (mt)
	Rice	Wheat	Coarse	Total		
1950-51	20.58	6.46	15.38	42.42	8.41	50.82
TE 1952-53	21.59	6.71	17.03	45.33	8.67	54.00
TE 1962-63	34.48	11.28	23.86	69.63	12.00	81.63
TE 1972-73	41.51	24.99	26.10	92.60	10.94	103.54
TE 1982-83	51.33	38.85	29.29	119.47	11.33	130.80
TE 1992-93	73.94	56.01	31.76	161.72	13.03	174.75
TE 2002-03	83.38	69.40	30.18	182.96	11.86	194.81
TE 2012-13	102.17	91.75	41.82	235.74	17.89	253.64
2018-19 (P)	115.63	101.20	43.33	260.16	23.22	283.37
2019-20 (2 Adv)	117.47	106.21	45.24	268.92	23.02	291.95

Notes: - Provisional figure in million tonnes.; * Growth=(Current Year-Base Year)*100/Base Year; Adv-Advance Estimates.
Source: GOI (2019).

However, despite the impressive growth and development, India is still home to the largest number of poor people of the world, as poverty remains widespread in India. In 2015, with the latest estimates, 176 million Indians were

living in extreme poverty[1] (20.6% share of world's poorest in 2013 which is estimated to declined to 13.5 per cent in 2015, at $1.90 a day 2011 PPP). Food availability and price stability, which are considered as a good measure of food security till 1970, were achieved through green revolution and Public Distribution System (PDS), however the chronic food security which is primary associated with poverty, still persisted in the country. In addition to this, per capita per day availability of food grains in India is still lower than level achieved in 1991. Though physical access to food was achieved, economic access at micro-level lagged behind indicating food and nutritional insecurity. The FAO report *'The State of Food Insecurity in the World 2018'* estimated that India is home to more than 195.9 million undernourished people, which is 14.8 percent of the national population (FAO, IFAD and WFP, 2019). As per Global Hunger Index 2019 (GHI, 2019a), India ranks 102nd out of 117 qualifying countries, with a score of 30.3, India suffers from a level of hunger that is serious (Pakistan 94th , 28.5; Bangladesh 88th- 25.8). India is home to the greatest population of severely malnourished children in the world. Accordingly, to the *National Family Health Survey of India*, 55 percent children living in rural areas suffer from malnutrition compared to 45 percent of children in urban areas. Rural poverty and food insecurity at household level remain pronounced, despite pervasive government interventions. Therefore, issue of ensuring food and nutritional security for masses has occupied a central place in recent policy debates in India (Kalamkar, 2011a).

The experience of last seven decades (1980-81 to 2019-20[2]) indicate that the growth rate of food grain production was the highest of 4.16 per cent per annum during the first decade (1950-51 to 1959-60) followed by 2.7 per cent during 1980-81 to 1989-90, while during this decade (2010-11 to 2019-20) growth rate is estimated to be 1.7 per cent per annum (Table 1.2). Except first decade when production growth was mostly driven by area growth (1.93 per cent), yield growth was instrumental in increase in production of food grains during all other decades. The stagnant growth of food grains production during 1990-01 to 2006-07 was partly contributed by the stagnant if not declining in area but largely by the decline

[1] https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_IND.pdf, accessed on March 25, 2020.
[2] as per second advanced estimates (https://pib.gov.in/newsite/PrintRelease.aspx?relid=199401)

or stagnant yield rate. Nevertheless, there have been signs of improvement during the recent years (Dev and Sharma, 2010; Kumar 2013 and GOI, 2013 & 2019), specifically after 2007-08. The significant and reverse turn in agricultural production occurred mainly due to the implementation of important programs, such as Rashtriya Krishi Vikas Yojana, National Food Security Mission, National Horticultural Mission (NHM), various sub-schemes and substantial increase in the State agricultural outlay on agriculture (GOI, 2013 & Kumar 2013).

Table 1.2: Decade-wise rate of Growth in Area, Production and Productivity of Foodgrains in India

Period	Decade-wise rate of Growth in Area, Production and Productivity of Food grains (% p.a.)					
	Area		Prod		Yield	
	CGR	Sign	CGR	Sign	CGR	Sign
1950-51 to 1959-60	1.93	0.01	4.16	0.11	2.23	0.57
1960-61 to 1969-70	0.52	3.42	1.84	12.23	1.31	17.37
1970-71 to 1979-80	0.46	10.01	2.05	5.61	1.59	5.99
1980-81 to 1989-90	-0.23	41.92	2.70	0.38	2.93	0.02
1990-91 to 1990-00	-0.07	68.97	2.07	0.03	2.14	0.00
2000-01 to 2009-10	0.29	32.64	1.88	3.49	1.59	1.22
2010-11 to 2019-20	0.35	11.62	1.70	0.12	1.37	0.42

Note: CGR- Compound Growth rate per cent per annum.
Source: estimated using data from GOI (2019).

1.1.1 Importance of Pulses:

Pulses are an important commodity group of crops that provide high quality protein complementing cereal proteins for pre-dominantly substantial vegetarian population of the country. India is by and large vegetarian in dietary habit and heavily depends upon vegetative source to meet out its daily protein, vitamins and minerals requirement, and is popularly known as "Poor man's meat" and "rich man's vegetable", contribute significantly to the nutritional security of the country. In comparison to other vegetables, pulses are rich in protein which are less expensive and can be cultivated as an inter-crop and also as mixed crop. Pulses can be produced with a minimum use of resources and hence, it becomes less costly even than animal protein. Pulses are mostly cultivated under rainfed conditions and do not require intensive irrigation facility and this is the reason why pulses are grown in areas left after satisfying the demand for cereals/cash

crops. Even in such conditions, pulses give better returns. Apart from this, pulses possess several other qualities such as it improve soil fertility and physical structure, fit in mixed/inter-cropping system, crop rotations and dry farming and provide green pods for vegetable and nutritious fodder for cattle as well. By-products of pulses like leaves, pod coats and bran are given to animals in the form of dry fodder. Some pulses like gram, lobia, uradbean and mungbean are fed to animals as green fodder. By the virtue of being a restores of soil fertility, pulses have a unique position in cropping system and dry land/rainfed agriculture (Kalamkar, 2003). The potential of pulses to help address future global food security, nutrition and environmental sustainability needs has been acknowledged through the UN declaration of the '2016 International Year of Pulses'. Pulses are a smart food as these are critical for food basket (dal-roti, dal-chawal), important source of plant protein and help address obesity, diabetes etc.

Probably no other country as like India produces and costumes as varied array of pulses (Kalamkar, 2003a). India is global leader in terms of production and consumption of pulses. India is leading importer of pulses because production of pulse/ legume crops has been stagnant over the years (Shende, et al. 2002; Singh *et.al* 2015) although situation has slightly changed in the recent past. In fact, size of holdings showed the highest negative effect on adoption of technology in pulses (Shende and Kalamkar, 2013). Consequent upon this, there is widening gap between demand and supply/availability of Pulses. About 20 per cent of the total pulses demand is met by imports only.

1.1.2 Growth in Production of Pulses:

Pulses are grown in all three seasons. The three crop seasons for the commodity are: (i) kharif – arhar (tur), urd (blackgram), moong (greengram), lobia (cowpea), kulthi (horsegram) and moth; (ii) rabi – gram, lentil, pea, lathyrus and rajmash; (iii) summer – greengram, blackgram and cowpea. Although this crop group is more important from the nutritional point of view, there has not any significant increase in area and production as well as per capita availability during 1953-54 to 2009-10, however, significant growth in area and production has been recorded during the last ten years (i.e. 2010-2011 to 2019-20), in which area

growth was instrumental followed by yield rate improvement (Table 1.3). With the increase in infrastructural and irrigation facilities/resources, the pulses get the marginalized treatment pushing them to another poor and marginal land piece. The productivity of pulses has increased about 91 per cent at 841 kg/ha during 2017-18 from the level of 441 kg/ha during 1950-51. It is imperative to mention that the New Agriculture Technology (NAT) introduced during mid-sixties has increased the production of food-grains from 50.82 million tonnes during 1950-51 to 283.37 million tonnes during 2018-19 with the increase in area from 97.32 million hectares to 127.56 million hectares. The productivity of food grains has also sharply increased to 2233 kg/ha during 2018-19 from the level of only 522 kg/ha during 1950-51. While area under pulses was stagnant during 1970s, 1990s and 2000s (Kalamkar, et al., 2002). The technical change in pulse crops is also slow compared to superior cereals and other cash crops as it compete with resources, research and infrastructure (Kalamkar, 2003). The share of area under pulses in total food grains was recorded the highest in 2017-18 (23.5 per cent), while share of pulses production in total food grains production was estimated to be 8.9 per cent in 2017-18 which was much lower that share of around 17 per cent recorded during 1950-1960 (Fig. 1.1 and 1.2). While during TE 2006-07 to TE 2016-17, the production of pulses had increased by 39 per cent, mainly due to significant increase in productivity growth (22 per cent) with support of area growth by 14 per cent over base year (Table 1.4). The per capita availability of pulses per day has increased to 494.1 gram in 2018 from 436 gram per day in 2006, which is still lower than record availability of 510 gram/day in 1991.

Table 1.3: Decade-wise rate of Growth in Area, Production & Productivity of Pulses in India

Period	Decade-wise rate of Growth in Area, Production and Productivity of Pulses (% p.a.)					
	Area		Prod		Yield	
	CGR	Sign	CGR	Sign	CGR	Sign
1950-51 to 1959-60	3.08	0.00	4.02	0.41	0.93	25.13
1960-61 to 1969-70	-1.33	0.18	-1.29	39.68	0.03	98.13
1970-71 to 1979-80	0.59	25.23	-0.39	79.48	-0.98	41.83
1980-81 to 1989-90	-0.10	82.50	1.48	12.29	1.57	2.53
1990-91 to 1990-00	-0.60	18.89	0.65	42.16	1.25	5.67
2000-01 to 2009-10	1.15	4.01	2.67	1.63	1.53	1.97
2010-11 to 2019-20	2.65	1.11	3.84	1.50	1.19	15.99

Fig. 1.1: Growth in Area under Pulses in India

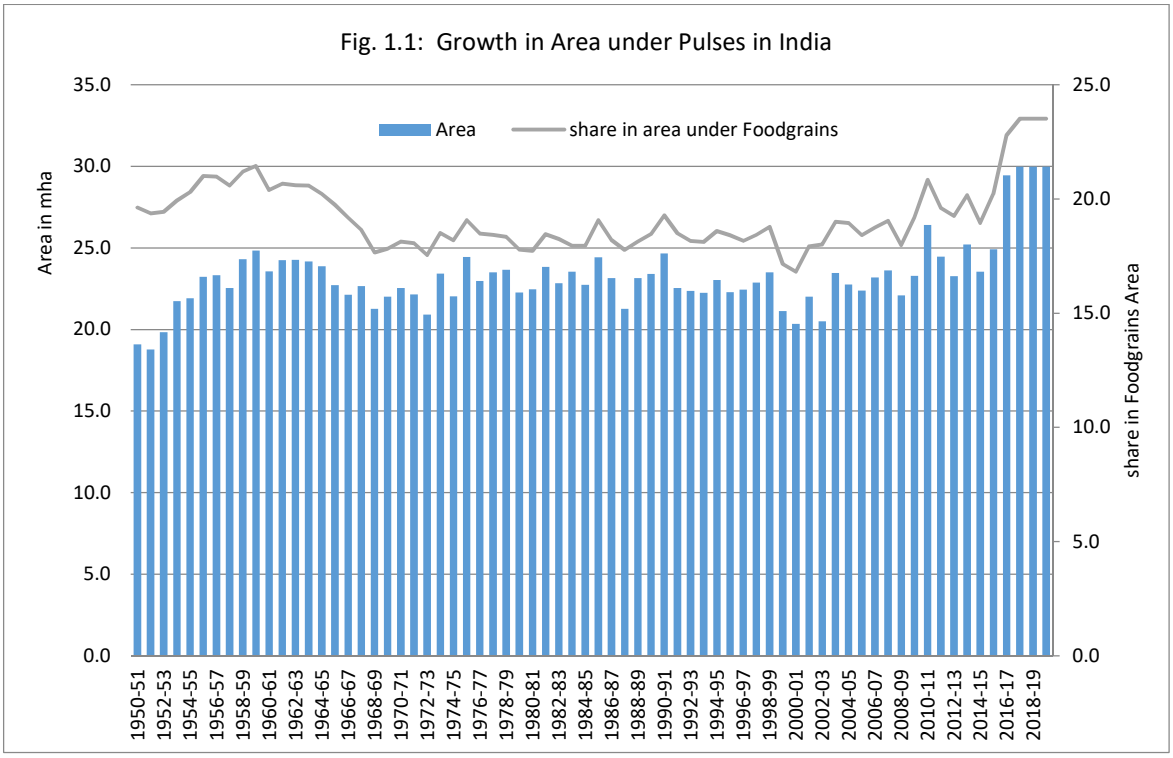


Fig. 1.2: Growth in Production of Pulses in India

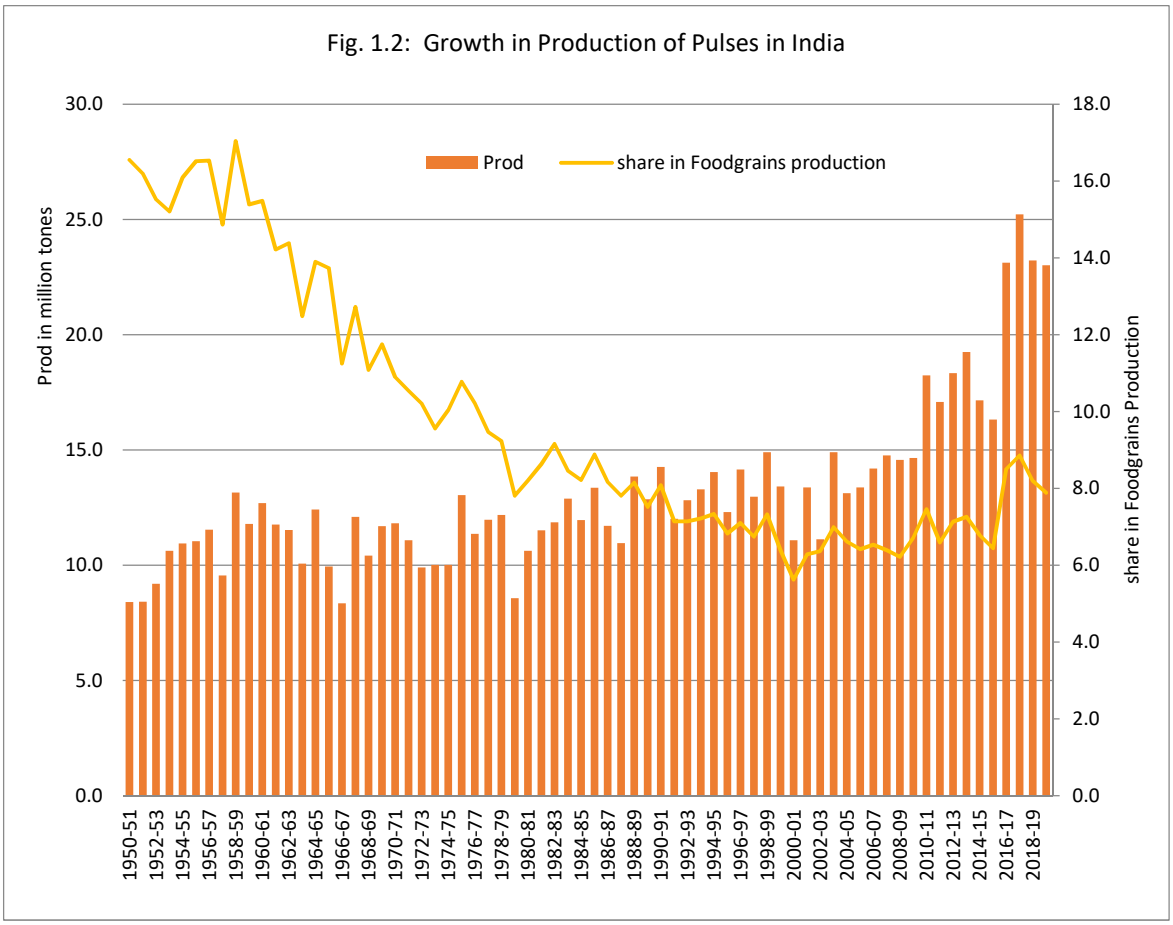


Table 1.4: Area, Production and Yield of Pulses in India (TE 2006-07 & TE 2016-17)

State/UT	Area ('000 Hectares)		Production ('000 Tonnes)		Yield (Kg/Ha.)	
	TE 2006-07	TE 2016-17	TE 2006-07	TE 2016-17	TE 2006-07	TE 2016-17
Andhra Pradesh	1856.5	1301.7	1247.3	1036.7	672	796
Arunachal Pradesh	7.3	12.4	7.8	13.5	1068	1090
Assam	104.7	145.6	58.1	108.7	555	747
Bihar	620.6	522.0	450.6	458.7	726	879
Chhattisgarh	930.2	876.0	438.2	669.7	471	765
Goa	11.1	4.9	12.4	4.7	1114	964
Gujarat	829.1	705.7	539.8	645.3	651	914
Haryana	181.3	88.1	134.7	65.9	743	748
Himachal Pradesh	30.3	29.8	22.2	47.4	733	1590
Jammu & Kashmir	28.5	19.3	14.3	9.6	500	499
Jharkhand	313.5	664.8	196.8	643.5	628	968
Karnataka	2152.0	2700.6	883.0	1422.2	410	527
Kerala	7.4	2.2	6.1	2.5	824	1094
Madhya Pradesh	4304.2	6016.8	3288.3	5474.0	764	910
Maharashtra	3548.0	3770.4	1991.0	2455.2	561	651
Manipur	7.7	31.4	4.0	30.3	522	965
Meghalaya	4.5	8.1	3.4	11.6	754	1431
Mizoram	5.1	3.8	6.2	5.3	1217	1379
Nagaland	33.4	37.7	36.6	43.3	1098	1149
Odisha	747.6	814.4	312.6	431.2	418	529
Punjab	34.7	43.8	28.3	39.4	817	898
Rajasthan	**3407.8**	**4166.7**	**1238.9**	**2374.4**	**364**	**570**
Sikkim	6.8	5.9	6.3	5.6	917	946
Tamil Nadu	553.7	849.5	237.7	578.4	429	681
Telangana		525.0		346.2		659
Tripura	8.6	17.4	5.5	14.2	633	813
Uttar Pradesh	2759.6	2247.0	2193.9	1595.9	795	710
Uttarakhand	53.0	63.5	32.7	53.1	616	836
West Bengal	222.3	288.2	165.1	276.7	743	960
A & N Islands	0.7	1.5	0.4	0.7	545	495
D & N Haveli	6.5	3.6	5.5	4.5	851	1248
Delhi	0.4	0.1	0.5	0.4	1250	3195
Daman & Diu	1.3	0.0	1.1	0.0	872	-
Puducherry	3.7	2.3	1.2	0.9	321	383
All India	**22782.0**	**25970.4**	**13570.5**	**18869.6**	**596**	**727**
Increase over base year (%)		14.00	--	39.05	--	21.98

Source: GOI (various years, Agricultural Statistics a Glance).

1.1.3 Policies for Pulses Development[3]:

With the unabated population increase, pulses production also have to be paralleled for the vegetarian Indian Society, as these are the prime source of balanced diet and protein particularly for the rural mass. Keeping in view this necessity, the following schemes and policies were adopted

- Centrally Sponsored Pulses Development Scheme was initiated as a plan intervention from the IVth Plan (1969-70 to 1973-74).
- Further, from VIIth Plan onward the National Pulses Development Project (NPDP) was implemented in 17 major states of the country.
- To supplement the efforts under NPDP, a Special Foodgrain Production Program (SFPP) on Pulses was also operationalized during 1988-89 on a 100% Central assistance basis.
- Under the GOI-UNDP Cooperation (1997-2003), Pulses Sector was identified as priority sector to be strengthened. Keeping in view the spectacular achievement through Technology Mission in Oilseeds (TMO), Pulses were brought within the ambit of Technology Mission in Oilseeds and Pulses (TMOP) in 1990.
- From 2004-05, pulses development were Integrated Scheme of Oilseeds, Pulses, Oilpalm and Maize (ISOPOM). The new technologies, timely supply of inputs, extension supports, remunerative price, marketing infrastructure and post-harvest technologies were the focused area to increasing pulses production with the Mission Mode approach. The CDD has been actively monitoring the programme implementation though out the county, through National Monitoring Team/ field visits allocation of Seed Minikit and its implementation and regularly interface with the Research and other stake holder organizations/ agencies in the country.
- Beginning of XIth Plan (2007-08 (Rabi)), in pursuance of the resolution adopted in 53rd meeting of National Development Council (NDC), a Centrally Sponsored Scheme on National Food Security Mission (NFSM) was launched. It was resolved to enhance the production of rice, wheat and pulses by 10, 8 and 2 million tonnes, respectively by the end of XI Plan.

[3] Based on GOI (2013), Pulses in India Retrospect & Prospects, Directorate of Pulses Development, Bhopal

- To further supplement the efforts to accelerate the pulses production, during XI Plan a centrally sponsored Accelerated Pulses Production Programme (A3P) (2010-11 to 2013-14)-as cluster demonstration approach; Special initiatives for pulses and oilseeds in dry land area (2010-11); and Integrated development of 60000 Pulses villages in Rainfed Areas (2011-12) both under RKVY and Special plan to achieve 19+ million tonnes of Pulses production during Kharif (2012-13) were also implemented, in addition to NFSM-Pulses. The implementation of the NFSM scheme is continued during XIIth Plan. A3P has been conceptualized to take up the active propagation of key technologies such as Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) in a manner that creates catalyzing impact by assuring farmers of the higher returns from the identified pulse crops.

1.1.3.1 National Food Security Mission

In order 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. The NFSM Programme had targeted to escalate/rise production of rice, wheat and pulses by 10, 8, and 2 million tonnes, respectively by the end of Eleventh Five Year Plan. The mission had adopted twofold strategy 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 chief measures adopted to augment the productivity included: (1) acceleration of quality seed production; (2) emphasizing INM and IPM; (3) promotion of new production technologies; (4) supply of adequate and timely inputs; (5) popularizing improved farm implements; (6) restoring soil fertility; and (7) introduction of pilot projects like community generator and blue bull. A total amount of Rs 4500 crores have been spent under NFSM during the 11th FYP (GOI 2014).

As stated above, NFSM aimed to escalate production of rice, wheat and pulses by 10, 8 and 2 million tonnes, respectively by the end of Eleventh 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, Rashtriya Krishi Vikas Yojana (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 11.88 mt, wheat production by 19.07 mt and pulses production by 2.89 mt as compared to the production during the year 2006-07 (see, Table 1.5).

Table 1.5: Target and Achievement of NFSM during XI Plan period

Crop	Production (*in million tonnes)*				Growth 2011-12 over 2007-08 (%)
	2006-07 (pre- NFSM year)	Target fixed for additional Production during XI Plan	2011-12 during (Terminal year of XI Plan	Increase over 11th plan average	
Rice	93.36	10	105.24	11.88	12.72
Wheat	75.81	8	94.88	19.07	25.15
Pulses	14.2	2	17.09	2.89	20.35
Food grains	217.28	20	259.29	42.01	19.33

Sources: GOI (2014), Sandhu, et al., 2014.

The main feature of NFSM has been the promotion of proven agriculture technologies to the farmers in relatively less productive districts. Several technologies and agriculture practices, including improved seeds, planting techniques, resource conservation tolls and technologies, nutrient and soil management, etc. have been delivered through the Mission during the last six years. Timely availability of critical inputs was accomplished through various interventions under the mission for which the response of farmers has been very enthusiastic[4].

After achieving the goal of increasing foodgrains production by 20 million tonnes during XIth Plan period under NFSM, new targets have been set to produce additional 25 million tonnes of foodgrains by 2016-17: 10 million tonnes of rice, 8 million tonnes of wheat, 4 million tonnes of pulses, and 3 million tonnes of coarse

[4] Forward by Secretary, DAC, MOA, Government of India to report by Sandhu, et al., (2014).

cereals (see, Table 1.6). The main focus is on cropping systems and on small and marginal farmers through development of farmer producer organizations (FPOs) and creating value chain and providing market linkages (GOI, 2014). The results of AERC study showed that NFSM programme has helped the selected farmers in raising their crop yield and income from crop cultivation (Dutta et al., 2015).

Table 1.6: Target fixed for XIIth Plan period under NFSM

Crop	Production (*in million tonnes)*				Targeted Growth 2016-17-12 as compared to 2011-12 (%)
	2011-12	Target fixed for additional Production during XI Plan	Target fixed for 2016-17 (Terminal year of XII Plan	Actual Production 2013-14	
Rice	105.30	10.0	115.30	106.54	9.50
Wheat	94.88	8.0	102.88	95.91	8.43
Pulses	17.09	4.0	21.09	19.27	23.41
Coarse Cereals*	43.40	3.0	46.40	43.05	6.91
Food grains	259.29	25.0	284.29	264.77	9.64

Note: *Coarse Cereals were included in XIIth plan
Sources: GOI (2014) and http://pib.nic.in/newsite/PrintRelease.aspx?relid=108768.

1.1.3.2 Seed Mini-kits Programme

NFSM-Pulses is one of the components of the centrally sponsored scheme of NFSM and is under implementation since *Rabi* 2007-08. This component has undergone a number of changes since its inception and finally has taken the shape of sole centrally sponsored scheme on pulses. Accelerated Pulses Production Programme (under NFSM) is another step forward for vigorous implementation of the pulse development under the NFSM-Pulses. Seed Mini-kits are meant for introduction and popularization of latest released /pre released varieties /hybrids not older than 10 years among the farmers free of cost. National and State Seed producing agencies supply minikits to State Government for distribution amongst farmers. Allocation of minikits is made to all farmers in contiguous area of at least 25 hectares. The size of minikits is 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong, urad and pigeon pea. This quantity is sufficient to plant 0.2 ha (0.49 acre). In addition, under this package, some State Governments (Karnataka) is also providing, a pamphlet regarding package of practice (POP) and phosphate solubilizing bacteria (PSB) culture of 100 grams per packet per minikit to pulse farmers. The price of seed minikits is fixed by National Food Security Mission-

Executive Committee (NFSM-EC) and the cost is reimbursed to the agencies on certification of receipt by the State Government. The State Government is required to educate/provide training to the farmers to multiply seed mini-kits seeds for further use. Seed minikits are distributed for rice, wheat, pulses and nutri-cereals. The agencies like NSC /HIL / KRIBHCO /NAFED/ IFFCO / IFFDC / Central Multi-state Cooperatives such as NCCF/SSCs etc., are involved in supply of seed minikits at the national level. The eligibility criteria for same are as follows:

- Minikits are distributed to farmers on the basis of priority to Scheduled Caste, Schedule Tribe, small, marginal and below poverty line farmers.
- 10 per cent of total cost of minikit will be charged as token money from the farmers.
- **Minikits are given to <u>women farmers</u> even if land owner is her husband/father/father in laws.**
- One minikit is given to only one woman in a family.
- If in a Gram Panchayat, SC and ST farmers are not available or negligible then only minikits are to be distributed to general category women farmers.
- Minikits are distributed to those farmers who were not benefited last three years.
- Priority will be given to those farmers having irrigation facilities

Tables 1.7 and 1.8 provide area, production and yield of total pulses in India during 2017-18 and Cropwise Seasonwise Area and Production of Pulses in India respectively, while crop-wise, season-wise, state-wise and agency wise details of seed minikit/varieties are given in Tables 1.9 to 1.10. Madhya Pradesh accounts for the one forth of area and almost one third of production of pulses of our country. Rajasthan is the second largest producer of the pulses accounting around 13 per cent in national pulses production with about 18 per cent share in area having almost two third pulses production in rabi season and rest in kharif season. Gram accounted the highest share of about 45 per cent in total pulses production followed by Tur (around 17 per cent) and Urad (14 per cent). The Statewise distribution of seed minikits together during two years period (2016-17 and 2017-18) indicate that Rajasthan, Uttar Pradesh, Andhra Pradesh and Madhya Pradesh together accounts for 52 per cent of total seed distributed. The seed distribution agencies were NSC, NAFED, HIL, KRIBHCO and IFFDC (Table 1.11).

Table 1.7: Area, Production and Yield of Total Pulses in India during 2017-18

State	Area, Production and Yield of Total Pulses 2017-18					Irrigation (%)
	Area		Production		Yield	
	mha	% to All India	million tonnes	% to All India	(kg/ha)	2014-15*
Madhya Pradesh	7.48	24.94	8.11	32.14	1084	42.8
Rajasthan	**5.33**	**17.77**	**3.39**	**13.42**	**635**	**20.7**
Maharashtra	4.35	14.50	3.30	13.09	759	10.9
Uttar Pradesh	2.27	7.57	2.21	8.75	974	27.4
Karnataka	3.02	10.07	1.86	7.35	614	8.6
Andhra Pradesh	1.41	4.70	1.22	4.85	870	2.0
Gujarat	0.91	3.03	0.93	3.67	1018	13.1
Jharkhand	0.79	2.63	0.85	3.35	1065	3.9
Tamil Nadu	0.87	2.90	0.55	2.18	635	10.9
Chhattisgarh	0.78	2.60	0.54	2.15	693	15.0
Telangana	0.57	1.90	0.51	2.01	885	5.1
West Bengal	0.46	1.53	0.44	1.76	969	15.0
Others	1.75	5.84	1.33	5.28	760	-
All India	29.99	100.00	25.23	100.00	841	**19.9**

Source: GOI (2018, Pulses Revolution**).**

Table 1.8: Cropwise Seasonwise Area and Production of Pulses in India (2017-18)

Crop	Seson	Cropwise Seasonwise Area and Production of Pulses in India							
		Area (mha)				Production (million tones)			
		Normal	2014-15	2017-18	% to total	Normal	2014-15	2017-18	% to total
Tur	Kharif	4.19	3.85	4.43	14.8	3.29	2.81	4.25	16.8
Urad	Kharif	2.70	2.48	4.50	15.0	2.08	1.96	3.56	14.1
	Rabi	0.81	0.76	0.94	3.1	-	-	-	0.0
	Total	3.51	3.25	5.44	18.1	2.08	1.96	3.56	14.1
Mung	Kharif	2.49	2.02	3.29	11.0	1.61	1.50	2.01	8.0
	Rabi	0.96	0.99	0.97	3.2	-	-	-	0.0
	Total	3.46	3.02	4.46	14.9	1.61	1.50	2.01	8.0
Gram	Rabi	8.95	8.25	10.56	**35.2**	8.43	7.33	11.23	44.5
Lentil	Rabi	1.39	1.47	1.55	5.2	1.08	1.04	1.61	6.4
Others	Kharif	1.81	1.63	1.87	6.2	-	-	-	0.0
	Rabi	1.97	3.55	1.88	6.3	-	-	-	0.0
	Total	3.79	5.18	3.75	12.5	2.35	2.56	2.57	10.2
Total	Kharif	11.19	10.00	14.08	46.9	6.55	5.78	9.34	37.0
	Rabi	14.08	13.56	15.91	53.1	12.29	11.42	15.89	63.0
	Total	**25.28**	**23.55**	**29.99**	100.0	**18.84**	**17.20**	**25.23**	100.0

Notes: Normal- 2012-13 to 2016-17;
Source: GOI (2018, Pulses Revolution**).**

Table 1.9: Crop-wise Distribution of Seed-Minikits (2016-17 to 2018-19)

Season	/ crop	Seed Minikits Distribution (qtls)					
		2016-17		2017-18		2018-19*	
		No.	Qty.	No.	Qty.	No.	Qty.
Kharif	Arhar	56900	2276	50750	2030	120175	4807
	Urad	93750	3750	165000	6600	93281	3731
	Moong	132550	5302	131875	5275	188188	7528
	Kharif Total	283200	11328	347625	13905	401644	16066
Rabi	Gram	168151	26904	222250	35560	209731	33557
	Moong	39000	1560			30000	1200
	Urad	85000	3400				
	Lentil	69938	5595	48125	3850	152875	12230
	Rabi Total	362089	37459	270375	39410	392606	46987
Summer	Urad	35000	1400	117500	4700	11900	476
	Moong	105000	4200	74000	2960	93850	3754
	Summer total	140000	5600	191500	7660	105750	4230
ALL	**Grand total**	**785289**	**54387**	**809500**	**60975**	**900000**	**67283**
Budget Allocation (*Rs. in Cr)*		61.74		75.01		76.71	

Source: GOI (2018, Pulses Revolution**).**

Table 1.10: State-wise distribution of Seed Minikit (2016-17 to 2017-18)

Sl. No	States	State-wise distribution of Seed Minikit (Nos)							
		2016-17				2017-18			
		Kharif	Rabi	Summer	Total	Kharif	Rabi	Summer	Total
1	Andhra Pradesh	-	19500	-	19500	6249	37500	41000	84749
2	Arunachal Pradesh	500	-	-	500	-	-	-	-
3	Assam	900	2700	-	3600	3166	-	-	3166
4	Bihar	3000	500	10000	13500	24999	10000	25000	59999
5	Chhattisgarh	7000	29000	4825	40825	13875	31874	2500	48249
6	Gujarat	5778	2202	-	7980	12500	4358	-	16858
7	Haryana	-	1347	-	1347	12500	11185	-	23685
8	Himachal Pradesh	485	-	-	485	-	-	-	-
9	J & Kashmir	500	-	-	500	-	625	4980	5605
10	Jharkhand	10285	5223	-	15508	12460	15625		28085
11	Karnataka	2550	7800	-	10350	25850	6250	600	32700
12	Kerala	500	-	-	500	5000	-	-	5000
13	Madhya Pradesh	9200	12915	25000	47115	21580	34373	-	55953
14	Maharashtra	28373	13692		42065	10792	31784	-	42576
15	Manipur	500	-	-	500	-	-	-	-
16	Meghalaya	500	-	-	500	-	-	-	-
17	Mizoram	500	-	-	500	-	-	-	-
18	Oddisa	8000	20668	-	28668	14000	37500	-	51500
19	Punjab	-	565	-	565	13375	9063	12500	34938
20	Rajasthan	29724	18950	-	48674	74400	48750	30000	153150
21	Tamil Nadu	-	13500	-	13500	17700	-	13500	31200
22	Telangana	2600	9938	-	12538	2718	-		2718
23	Tripura	500	500	-	1000	1000	-	2500	3500
24	Uttar Pradesh	14751	55566	50870	121007	49998	69211	16900	136109
25	Uttarakhand	1500	-	-	1500	4244	6250	-	10494
26	West Bengal	-	11000	6750	17750	1250	-	-	1250
	Total	127646	225566	97445	450477	327656	354348	149480	831484

Source: GOI (2018, Pulses Revolution**).**

Table 1.11: Agency–Wise distribution of Seed Minikits (2016-17 & 2017-18)

Sl No.	Agency	Agency–Wise distribution of seed minikits (Nos)					
		Kharif		Rabi		Summer	
		T	A	T	A	T	A
A	**2016-17**						
1	NSC	182200	101266	252470	142857	15000	-
2	NAFED	12000	11200	20000	20000	25000	25000
3	HIL	89000	15180	61250	42610	100000	72445
4	KRIBHCO	-	-	12500	4230	-	-
5	IFFDC	-	-	15869	15869	-	-
	Total	**283200**	**127646**	**362089**	**225566**	**140000**	**97445**
B	**2017-18**						
1	NSC	131225	113168	200400	190398	111500	85080
2	NAFED	112500	111590	82250	82248	-	-
3	HIL	61500	60498	41875	30183	80000	64400
4	KRIBHCO	17400	17400	16000	16000	-	-
5	IFFDC	25000	25000	36250	35519	-	-
	Total	**347625**	**327656**	**376775**	**354348**	**191500**	**149480**
C	**2018-19 (kharif)**						
1	NSC	276856	**-**	**-**	**-**	**-**	**-**
2	NAFED	35000	**-**	**-**	**-**	**-**	**-**
3	HIL	20000	**-**	**-**	**-**	**-**	**-**
4	KRIBHCO	23538	**-**	**-**	**-**	**-**	**-**
5	IFFDC	47250	**-**	**-**	**-**	**-**	**-**
	Total	402644	**-**	**-**	**-**	**-**	**-**

Notes: T- Target; A- Achievement
Source: GOI (2018, Pulses Revolution).

1.2 Need for the Study

The latest released / pre-release varieties/ hybrids not older than 10 years are popularized through distribution of seed minikits free of cost to the farmers. The required leaflets on cultural practices are to be kept in the seed Minikits along with Rhizobium / PSB culture wherever it is required in the respective seed packet of Minikits. The purpose is to ensure, that the identified farmer is capable of raising the crop with care & diligence such that the plot serves as a good demonstration to other farmers. As the programme is under progress for last three to four years, it is required to see the various aspects of implementation of this programme. How efficiently the distribution of seeds is taking place? We need to check whether the scheme is relevant and useful from the viewpoint of farmers. It is also important to examine whether seed minikits have any significant impact on productivity and how much area is being cropped under such seeds. Therefore, keeping the importance in mind, the present study was unertaken to examine the need, application, pertinence and efficiency in distribution of seed minikits.

1.3 Objectives and Scope of the Study

The NFSM is extended to 12th Five Year Plan due to its success in achieving the targeted goal of production enhancement during XIth plan period. It is essential to evaluate and measure the extent to which the programme and approach has stood up to the expectations. The study enlightens the policy makers to incorporate necessary corrections to make the programme more effective and successful. With this main objective, the study was undertaken to achieve the specific objectives as given below:

1. To assess the relevance and the requirement of seed mini-kits among the farmers
2. To compare the productivity of pulse crops using seed minikits with the control farmers/non users
3. To suggest policy measures to address the efficiency issues in application/distribution of seed mini-kits.

1.4 Data and Methodology

The study is based on secondary and primary level data. The secondary data on area, production and productivity of pulse crops and related parameters were compiled from various publications of Ministry of Agriculture and Farmers Welfare, Government of India and as well as office of the Commissioner of Agriculture, Government of Rajasthan, Jaipur, related websites, research reports, papers and presentations.

The primary data were collected from the state of Rajasthan. For the selection of sample in each state, two districts were selected, one irrigated and one dryland based on highest seed minikits distributed during the reference period of 2017-18 and 2018-19. Accordingly, Bundi (irrigated) and Naguar (Rainfed) district were selected (Map 1.1). From each selected district, a sample of 100 seed minikit beneficiary farmers and 50 control group pulse growing farmers were selected using random sampling method. In this way a total number of 200 beneficiaries and 100 non beneficiaries were selected in Rajasthan state (Table 1.12 and Fig 1.3). Lentil and Urad seed minikits beneficiaries were selected from Bundi district and Gram and Mung beneficiaries were selected from Naguar district.

In order to see whether seed minikits are being used to replicate seed and use the reproduced seed to expand area in the forthcoming years, it is tried to include the cases of seed minikits distribution in the last two years. Therefore, in order to select households, the seed minikits distribution list was collected for the year 2017-18 and 2018-19. The sample was drawn in proportion to total number of minikits distributed of particular crop in the selected district. While selecting the households, the sample was included for both these years and collected the information on area sown, productivity and resources used for the seed minikits pulse crops as well as the reproduced seed pulse crops. Seed minikits of green gram and black gram was distributed during kharif season, while seed minikits of red gram and lentil crop were distributed during the rabi season.

Map 1.1: Location Map of Study Area in Rajasthan, India

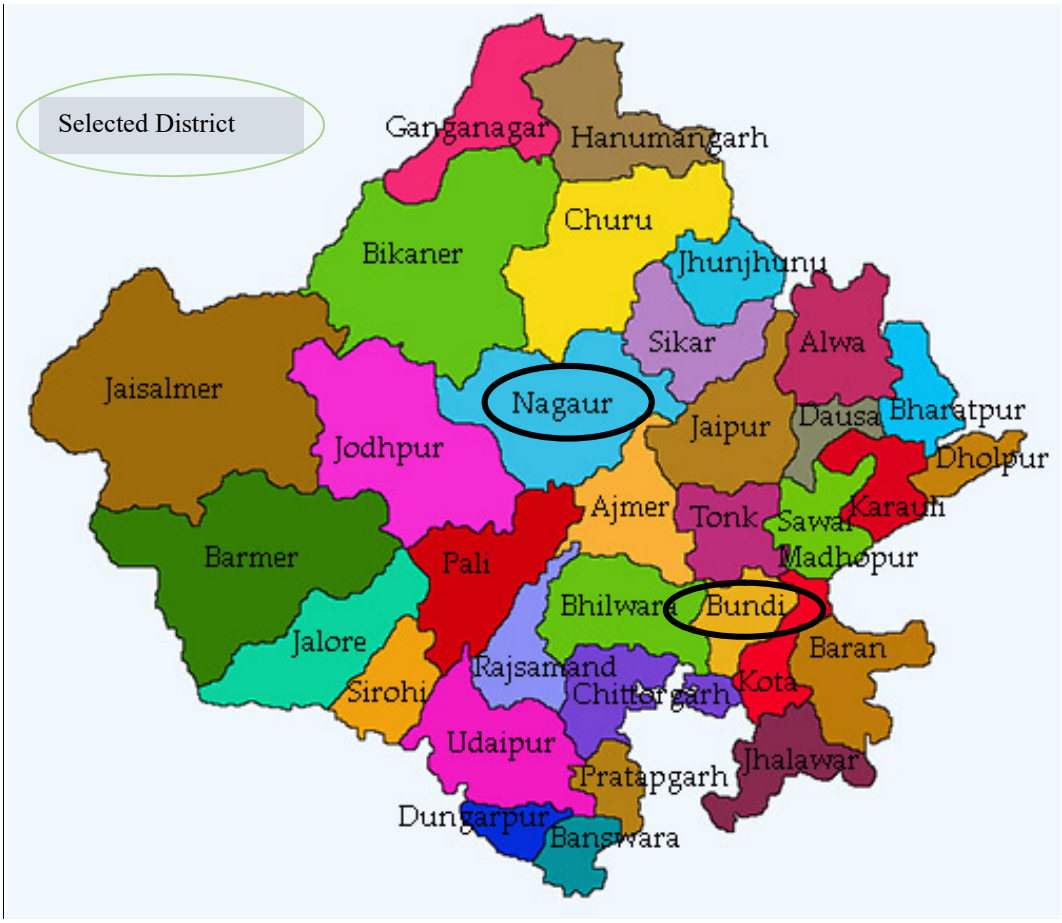
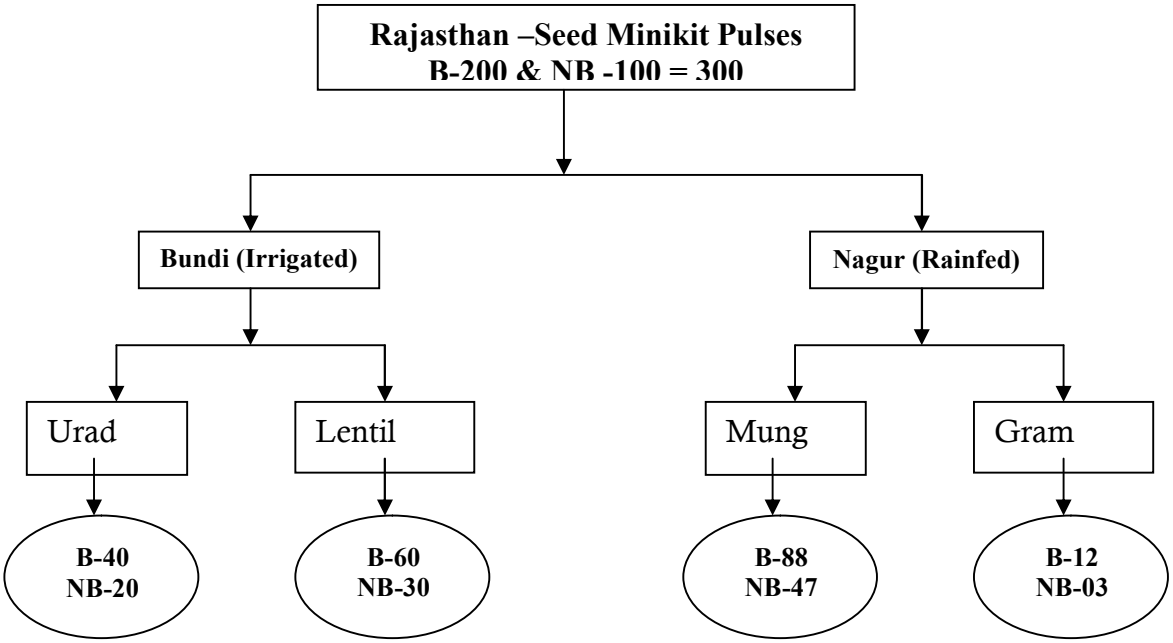


Figure 1.3: Multistage Sampling Method



Note: B-Beneficiarias; NB-Non-Beneficiarias

The selected sample households were further categorised as per their operational land handling during the survey year

- Marginal – Less than 2.5 acres (1 ha)
- Small – 2.5 to 5.0 acre (1-2 ha)
- Medium- 5-10 acre (2-4 ha)
- Large- 10 acre and above (4 ha and above)

As per the eligibility criteria for this programme, minikits are given to women farmers even if land owner is her husband/father/father in laws and one minikit is given to only one woman in a family. Thus, data were collected from the female respondents supported by their male family members (for accuracy of data on cost of cultivation, production and marketing).

As the distribution of minikit was done across the villages in selected districts, total 39 villages were visited in Bundi and 15 villages in Nagur district to cover the stipulated sample size (as per the list of beneficiary received from the State Agriculture Department of respective district) (Table 1.13).

Table 1.12: Selected Districts and Number of Sample Households in Rajasthan

Sr. No.	Crops (Season)	Bundi			Naguar		
		Beneficiary	Non Beneficiary	Total	Beneficiary	Non Beneficiary	Total
A	Urad (kharif)	40	20	60	-	-	-
B	Mung (kharif)	-	-	-	88	47	135
C	Gram (Rabi)	-	-	-	12	03	15
D	Lentil (Rabi)	60	30	90	-	-	-
	All Total	100	50	150	100	50	150

Table 1.13: Number of Villages covered in selected districts of Rajasthan

Sr. No.	Crops (Season)	Bundi (39)	Naguar (15)	Total (54)
A	Urad (kharif)	17	0	17
B	Mung (kharif)	0	14	14
C	Gram (Rabi)	0	01	01
D	Lentil (Rabi)	33	00	33
	All Total	50	15	65

Average annual growth rate, correlation and graphical analysis were applied using this secondary information.

1.5 Limitations:

As the sample number was drawn in **proportion to total number of seed minikit of selected crop distributed in particular district**, the number of sample farmers for rabi crop like gram in Nagaur district was only 12 samples. The attempt was to cover all four seed minikits to get ground reality about the scheme in Rajasthan. Thus, sample number is small and may not represent the whole population.

Besides, the crop failure was the main problem in estimation of value of output and net returns. Around 18 per cent of beneficiary households and 8 per cent of non beneficiary households at overall level had realised production less than one quintal in acre of which some of them did not reap any harvest (see

Annexure I). The highest crop failure was in lentil rabi crop grown in Bundi district.

1.6 Organisation of the Report

The present report is organized in five chapters. The first chapter discusses the background, 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 trend analysis in area, production and productivity of pulses in Rajasthan. The district wise scenario of pulses production 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, production , cost and returns from pulses production have been analyzed in Chapter III. The fourth chapter discusses the efficiency of seed minikits in Rajasthan. The last chapter presents the summary, concluding observations and policy implications of the study.

The next chapter presents the details on pulses production in Rajasthan.

Chapter II

Production of Pulses in Rajasthan

2.1 Introduction:

Rajasthan is the largest state having about 10.41 percent of the total geographical area of the country. It supports 5.5 percent of human population and about 11 percent of the country's livestock population. Agriculture and allied activities, however, remain the primary and major economic activity in the state providing livelihood to 66 percent of the state's population. Because of the limited water resources, most of the agriculture production is rain-fed. Rajasthan State accounts for about 6.9 per cent of total food grains production of country during 2017-18 from 14.24 mha area having 11.16 per cent share in national coverage under foodgrains. It is important to note the low coverage of food grains under irrigation in Rajasthan (35.9 per cent) as compared to 53.1 per cent of area coverage under irrigation at national level (2014-15). In case of pulses production, state of Rajasthan holds second position after Madhya Pradesh and accounts for 13.4 per cent in total national pulses stock having 17.8 per cent of national area under pulses (5.33 mha), while lower area under irrigation coverage (21 per cent) resulted in low level of productivity of pulses of 635 kg/ha as compared to 841 kg/ha at national level.

2.2 Area and Production of Major crops in the State:

The area and production of major crops in the State during 1990-91 to 2018-19 is presented in table 2.1. It can be seen from the table that area under foodgrains has increased by about 7 per cent while production has increased by almost 110 per cent which was mainly due to increase in productivity from 753 kg per ha to 1475 kg per ha during corresponding period. While in case of pulses, area under pulses has increased by 20 per cent and production was increased by around 77 per cent mainly due to increase in productivity from 417 kg per hectare to 617 kg per ha. Area under tur and coarse cereals crops had declined over the period and significant increase in area under pulses crops was under green gram and black gram. Oilseed production had increased significantly by more than three times during corresponding period.

The growth rate in area and yield rate of major crops in the state presented in Table 2.2 indicate that during 200-01 to 2009-10, area under pulses along with significant increase in productivity was reported. Though during subsequent period (2010-11 to 2016-17), large area was brought under pulses crop cultivation mainly due to RKVY and NFSM, productivity lost its growth and reported declined may be due to adverse climatic conditions as well as attack of pests.

Table 2.1: Area and Production of Major crops in the State

Year	Area and Production of Major crops in the State (Area in lakh hectares, production in lakh tones)									
	Rice		Coarse cereals		Wheat		Pulses		Foodgrains	
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
TE 90-91	1.23	1.60	73.05	44.92	17.45	38.91	48.82	20.34	140.55	105.76
TE 91-92	1.26	1.57	67.46	35.29	17.48	40.62	50.64	23.01	137.90	102.10
TE 92-93	1.34	1.94	66.74	36.92	19.48	46.45	46.76	22.70	136.40	111.28
TE 93-94	1.41	2.19	63.10	28.14	20.14	43.62	39.29	18.47	126.80	96.61
TE 94-95	1.47	2.46	64.20	33.21	21.95	47.40	34.57	14.98	124.96	102.21
TE 95-96	1.46	2.17	61.02	25.86	21.77	48.55	35.01	14.98	121.81	95.43
TE 96-97	1.49	2.33	62.07	30.86	23.31	59.63	36.45	17.55	125.95	114.78
TE 97-98	1.50	2.41	60.90	32.47	24.50	63.25	39.05	19.78	128.74	122.64
TE 98-99	1.60	2.85	60.53	35.37	26.40	67.88	42.52	23.07	134.00	134.15
TE 99-00	1.77	3.24	57.78	31.39	26.99	67.71	38.25	19.90	127.68	127.18
TE 00-01	1.78	3.07	57.94	28.72	25.75	63.86	31.56	13.56	119.71	113.72
TE 01-02	1.70	2.94	61.59	37.31	24.16	62.23	27.37	10.17	117.23	117.09
TE 02-03	1.31	2.02	59.19	34.68	21.33	56.05	25.12	8.81	109.26	106.10
TE 03-04	1.09	2.06	63.98	54.91	20.64	57.14	30.07	23.33	117.99	142.08
TE 04-05	0.95	1.92	62.10	51.53	19.71	54.87	30.63	22.83	115.66	135.72
TE 05-06	1.03	2.34	68.24	57.45	20.79	58.16	35.95	24.00	128.38	146.66
TE 06-07	1.06	2.37	64.53	42.91	22.33	64.41	33.61	11.76	123.94	126.65
TE 07-08	1.14	2.91	66.50	49.70	24.27	69.14	34.62	12.58	129.06	139.82
TE 08-09	1.23	2.95	66.56	59.17	24.69	73.49	35.17	15.77	130.43	158.37
TE 09-10	1.37	2.86	68.23	70.77	23.96	72.13	39.79	21.34	138.34	184.60
TE 10-11	1.38	2.45	66.94	76.00	25.28	82.71	41.04	23.73	139.35	202.06
TE 11-12	1.39	2.49	63.09	74.90	27.38	92.04	39.29	23.81	136.13	212.03
TE 12-13	1.30	2.47	58.47	66.18	29.57	102.84	34.96	21.00	100.68	202.81
TE 13-14	1.35	2.63	55.26	60.17	30.08	104.37	34.94	19.77	69.46	195.44
TE 14-15	1.46	3.01	55.03	55.73	31.33	103.13	37.25	20.09	71.82	190.53
TE 15-16	1.65	3.50	54.19	55.65	31.49	102.22	44.62	23.25	106.02	198.71
TE 16-17	1.83	3.96	55.04	53.83	31.97	106.98	49.78	28.42	141.81	211.89
TE 17-18	1.90	4.24	55.88	58.19	31.08	111.87	56.88	34.16	149.84	225.68
TE 18-19	1.95	4.52	57.09	62.35	30.50	111.11	58.38	36.04	150.28	221.68

Sources: Commissioner of Agriculture, Government of Rajasthan, Jaipur & https://eands.dacnet.nic.in/

Table 2.1…..continues…

Year	Area and Production of Major crops in uthe State (Area in lakh hectares, production in lakh tones)									
	Oilseeds		Black Gram (Urad)		Red Gram (Tur)		Bengal Gram (Gram)		Green Gram (Moog)	
	Area	Prod	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
TE 90-91	26.25	20.39	1.00	0.23	0.33	0.23	13.59	8.96	2.28	0.28
TE 91-92	30.54	23.03	1.49	0.35	0.30	0.16	12.75	8.00	3.43	0.41
TE 92-93	40.28	28.77	1.52	0.44	0.27	0.14	13.77	8.28	3.55	0.77
TE 93-94	42.04	28.93	1.63	0.51	0.20	0.08	12.33	7.40	3.80	0.80
TE 94-95	41.80	29.35	1.63	0.52	0.21	0.10	14.19	9.71	4.05	1.09
TE 95-96	36.43	27.69	1.60	0.52	0.21	0.09	14.76	10.70	4.18	0.87
TE 96-97	37.35	31.44	1.67	0.58	0.26	0.15	15.75	11.77	4.77	1.50
TE 97-98	40.47	33.00	1.88	0.78	0.33	0.23	17.84	13.62	5.48	1.62
TE 98-99	42.03	35.48	1.95	0.75	0.34	0.31	21.83	16.90	5.86	1.55
TE 99-00	41.21	35.07	1.67	0.62	0.32	0.28	20.02	15.59	5.27	0.88
TE 00-01	35.29	30.85	1.35	0.40	0.25	0.20	14.88	10.49	4.69	0.60
TE 01-02	31.29	28.56	1.38	0.44	0.25	0.13	8.73	6.03	5.25	1.09
TE 02-03	27.34	23.05	1.84	0.48	0.22	0.09	6.97	4.91	5.58	1.06
TE 03-04	29.27	29.60	2.27	0.79	0.20	0.11	8.46	5.94	6.82	2.51
TE 04-05	36.09	37.71	2.15	0.75	0.18	0.11	8.68	6.07	7.00	2.51
TE 05-06	45.45	51.74	1.75	0.71	0.19	0.14	10.79	6.53	7.95	2.83
TE 06-07	49.79	55.63	1.31	0.40	0.19	0.12	10.43	7.08	7.72	2.02
TE 07-08	46.00	51.08	1.29	0.48	0.19	0.13	11.08	6.42	8.73	2.72
TE 08-09	43.81	48.45	1.29	0.50	0.19	0.13	11.67	8.09	9.02	3.53
TE 09-10	46.65	53.03	1.31	0.49	0.18	0.12	11.25	6.97	9.56	4.10
TE 10-11	48.49	58.12	1.27	0.55	0.20	0.13	13.09	10.39	9.53	4.88
TE 11-12	49.33	61.89	1.66	0.86	0.20	0.12	13.67	10.42	10.82	5.80
TE 12-13	48.75	59.94	2.13	1.17	0.19	0.15	14.90	12.89	10.38	5.11
TE 13-14	48.20	58.46	2.55	1.09	0.17	0.12	15.37	13.03	10.28	4.24
TE 14-15	47.99	55.64	2.55	1.03	0.15	0.11	14.78	12.76	9.02	3.62
TE 15-16	46.51	48.74	2.55	0.99	0.13	0.09	13.74	11.31	10.93	4.83
TE 16-17	47.89	52.86	2.55	1.77	0.14	0.12	12.49	10.54	14.59	7.02
TE 17-18	45.71	55.04	2.55	3.15	0.14	0.13	13.54	13.13	19.11	8.73
TE 18-19	44.39	65.10	4.20	4.02	0.13	0.14	15.72	16.46	22.79	10.81

Sources: Commissioner of Agriculture, Government of Rajasthan, Jaipur & https://eands.dacnet.nic.in/

Table 2.2: Growth rate in area and yield rate of major crops in the state (%)

Period	Growth rate in area and yield rate of major crops in the state (%)									
	Rice		Coarse cereals		Wheat		Pulses		Food grains	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
1980-81 to 1989-90*	-3.15	1.34	-3.97	-5.45	-1.15	3.77	2.73	-3.64	0.31	0.99
	0.11	*0.73*	*0.01*	*0.24*	*0.35*	*0.01*	*0.16*	*0.34*	*0.80*	*0.65*
1990-91 to 1999-00*	4.07	4.12	-2.03	0.52	4.93	1.47	-3.75	0.28	-1.17	3.53
	0.00	*0.03*	*0.01*	*0.87*	*0.00*	*0.32*	*0.15*	*0.91*	*0.23*	*0.04*
2000-01 to 2009-10*	0.59	2.97	1.42	7.49	1.53	2.20	**5.85**	**4.10**	2.80	3.99
	0.82	*0.38*	*0.35*	*0.10*	*0.23*	*0.00*	*0.04*	*0.49*	*0.10*	*0.08*
2010-11 to 2016-17*	7.94	2.60	-1.43	-3.20	1.74	-0.03	8.36	-0.05	6.46	-4.64
	0.00	*0.13*	*0.25*	*0.18*	*0.04*	*0.99*	*0.07*	*0.99*	*0.59*	*0.67*
2012-13 to 2013-14**	15.87	21.23	-4.86	15.46	4.49	-2.67	29.34	-35.72	2.71	-6.78
2013-14 to 2014-15**	15.23	1.80	-1.57	-26.11	3.63	-13.97	-11.13	15.19	177.22	-66.27
2014-15 to 2015-16**	9.02	-7.49	2.04	22.18	-6.20	14.57	46.28	14.24	16.63	7.49
2015-16 to 2016-17**	8.13	13.21	4.24	-3.31	7.65	9.83	5.29	1.63	4.07	-1.13

Notes: *CGR per cent per annum; ** Growth over previous year (per cent), figures in italic are respective 'significance' values.

Period	Oilseeds		Black Gram		Red Gram		Bengal Gram		Green Gram	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
1980-81 to 1989-90*	8.50	7.01			-4.34	1.42	-5.14	-0.56		
	0.00	*0.00*			*0.34*	*0.82*	*0.14*	*0.69*		
1990-91 to 1999-00*	1.28	2.73	0.45	3.56	1.92	9.46	3.14	2.70	5.23	-0.83
	0.50	*0.03*	*0.82*	*0.22*	*0.58*	*0.08*	*0.42*	*0.10*	*0.02*	*0.90*
2000-01 to 2009-10*	7.96	4.07	-4.25	0.70	-2.39	4.38	5.65	-0.98	7.12	11.91
	0.01	*0.04*	*0.21*	*0.86*	*0.12*	*0.39*	*0.11*	*0.71*	*0.00*	*0.13*
2010-11 to 2016-17*	0.13	-2.48	7.70	3.88	-5.84	1.85	-4.41	0.78	8.83	-1.51
	0.91	*0.48*	*0.14*	*0.70*	*0.13*	*0.70*	*0.37*	*0.79*	*0.19*	*0.77*
2012-13 to 2013-14**	-15.41	4.89	0.00	-43.68	-13.86	-26.08	53.52	-16.33	28.90	29.39
2013-14 to 2014-15**	8.86	-5.08	0.00	59.05	-9.05	13.11	-34.69	-14.98	-12.42	34.31
2014-15 to 2015-16**	-0.68	-28.37	0.00	2.11	-7.41	-25.52	-25.02	23.02	52.59	-15.07
2015-16 to 2016-17**	1.19	65.93	0.00	166.57	46.40	98.61	64.33	2.06	55.45	13.11

Notes: *CGR per cent per annum; ** Growth over previous year (per cent), figures in italic are respective 'significance' values.

2.3. Pulse Production in Rajasthan – District Level Analysis

The district-wise wise geographical, cultivable and pulses crop area in the state are presented in Table 2.3. It can be seen from the table that the share of the cultivable area to total geographical area is about 75 per cent which is almost same during the two period points, i.e. TE 2006-07 and TE 2016-17. While share of the area under pulses to total cultivable area has increased from 13.4 per cent to almost 17 per cent during the corresponding two period points. Thus over the period of one decade, area under pulses has increased by 3.6 per cent points. Bundi, Pali, Ajmer and Tonk district has registered the significant increase in share of area under pulses to cultivable area during two points period. The district-wise production and yield of Pulses presented in Table 2.4 shows that Nagaur district is the largest producer of pulses (12.41%) followed Bikaner (11.61%), Churu (7.49%), Ajmer (6.55%), Pali and Jaipur (6% each), while Bundi contributes about 3 per cent share in state pulses production during 2016-17 (Fig. 2.3).

Fig. 2.1: Districtwise Share of Area under Pulses to Cultivable Area

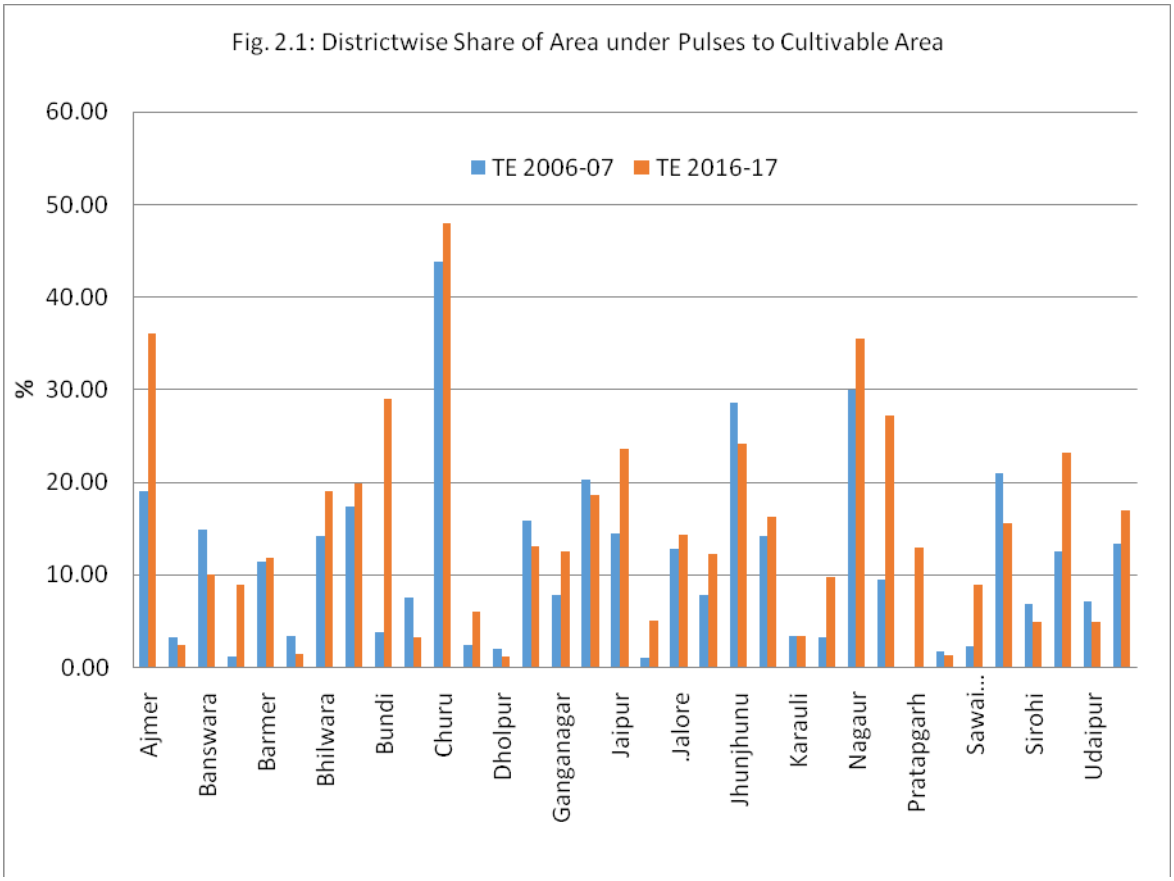


Table 2.3: District wise Geographical, Cultivable and Pulses Crop Area in Rajasthan

Area in lakh hectares

District	Geographical Area (2017-18)	Cultivable Area during		% age Cultivable Area to geographical area		Area under Pulses crops		% age Pulses Area to cultivable area	
		TE 2006-07	TE 2016-17	TE 2006-07	TE 2016-17	TE 2006-07	TE 2016-17	TE 2006-07	TE 2016-17
1.Ajmer	8.43	5.69	5.70	67.52	67.65	1.08	2.05	19.02	35.96
2.Alwar	7.83	5.51	5.47	70.39	69.87	0.17	0.13	3.12	2.29
3.Banswara	4.54	3.11	2.88	68.52	63.49	0.46	0.29	14.87	10.02
4.Baran	6.99	3.84	3.83	54.85	54.73	0.04	0.34	1.08	8.87
5.Barmer	28.17	23.84	23.76	84.61	84.34	2.71	2.78	11.36	11.72
6.Bharatpur	5.07	4.14	4.14	81.74	81.68	0.14	0.06	3.27	1.34
7.Bhilwara	10.51	6.41	6.42	61.03	61.13	0.91	1.22	14.11	19.04
8.Bikaner	30.42	26.07	25.94	85.69	85.29	4.50	5.14	17.28	19.81
9.Bundi	5.82	3.27	3.26	56.22	56.00	0.12	0.95	3.77	29.00
10.Chittorgarh	7.51	6.11	4.39	81.42	58.44	0.45	0.14	7.43	3.21
11.Churu	13.86	12.77	12.75	92.14	91.99	5.60	6.12	43.84	47.99
12.Dausa	3.41	2.52	2.52	73.87	73.95	0.06	0.15	2.37	5.99
13.Dholpur	3.01	1.81	1.81	60.19	60.20	0.04	0.02	1.95	1.15
14.Dungarpur	3.86	1.94	1.96	50.23	50.89	0.31	0.26	15.85	13.06
15.Ganganagar	10.93	9.62	9.59	87.99	87.75	0.74	1.20	7.72	12.50
16.Hanumangarh	9.70	8.92	8.89	91.89	91.60	1.81	1.65	20.25	18.55
17. Jaipur	11.06	8.16	8.03	73.77	72.67	1.18	1.89	14.47	23.57
18.Jaisalmer	38.39	32.13	31.54	83.70	82.14	0.31	1.59	0.98	5.04
19.Jalore	10.57	8.64	8.63	81.81	81.65	1.10	1.23	12.71	14.26
20.Jhalawar	6.32	3.98	3.95	62.94	62.43	0.31	0.48	7.78	12.15
21.Jhunjhunu	5.92	4.75	4.74	80.28	80.20	1.36	1.15	28.60	24.17
22.Jodhpur	22.56	19.02	19.01	84.30	84.25	2.69	3.08	14.12	16.18
23.Karauli	5.04	2.30	2.28	45.61	45.25	0.08	0.08	3.38	3.37
24.Kota	5.18	3.17	3.15	61.12	60.86	0.10	0.30	3.25	9.64
25.Nagaur	17.75	15.28	15.28	86.11	86.06	4.57	5.41	29.87	35.43
26.Pali	12.33	8.58	8.57	69.58	69.48	0.81	2.33	9.38	27.22
27.Pratapgarh	4.12		2.30	NA	55.77	0.00	0.30		12.89
28.Rajsamand	4.53	2.45	2.43	54.07	53.78	0.04	0.03	1.73	1.24
29.S Madhopur	4.97	3.26	3.25	65.56	65.34	0.07	0.29	2.26	8.83
30.Sikar	7.74	6.20	6.18	80.13	79.81	1.30	0.96	20.94	15.56
31.Sirohi	5.18	2.29	2.29	44.24	44.23	0.15	0.11	6.75	4.86
32.Tonk	7.18	5.71	5.71	79.60	79.59	0.71	1.32	12.46	23.11
33.Udaipur	13.88	4.66	4.36	33.59	31.43	0.33	0.21	7.06	4.90
State Total	342.79	256.17	255.03	74.73	74.40	34.25	43.25	13.37	16.96

Source: GOR (various years Ag Statistics a Glance).

Fig. 2.2: Districtwise Share in Total Area under Pulses in Rajasthan

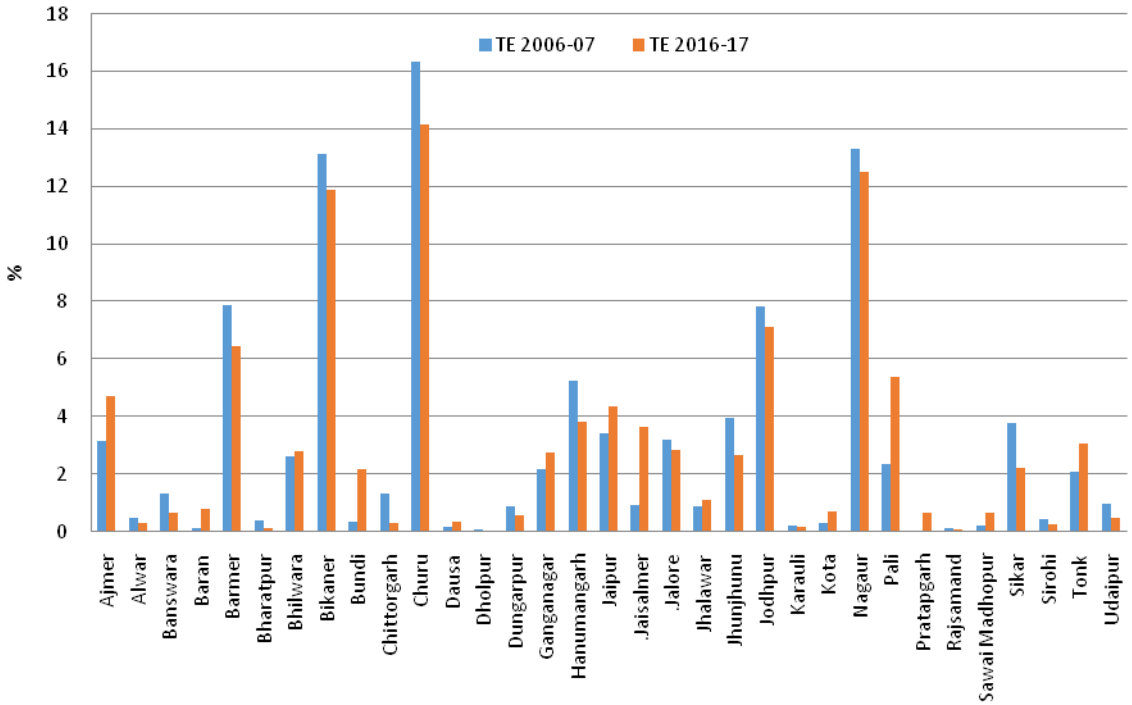


Fig. 2.3: Districtwise Production of Pulses in Rajasthan (2016-17)

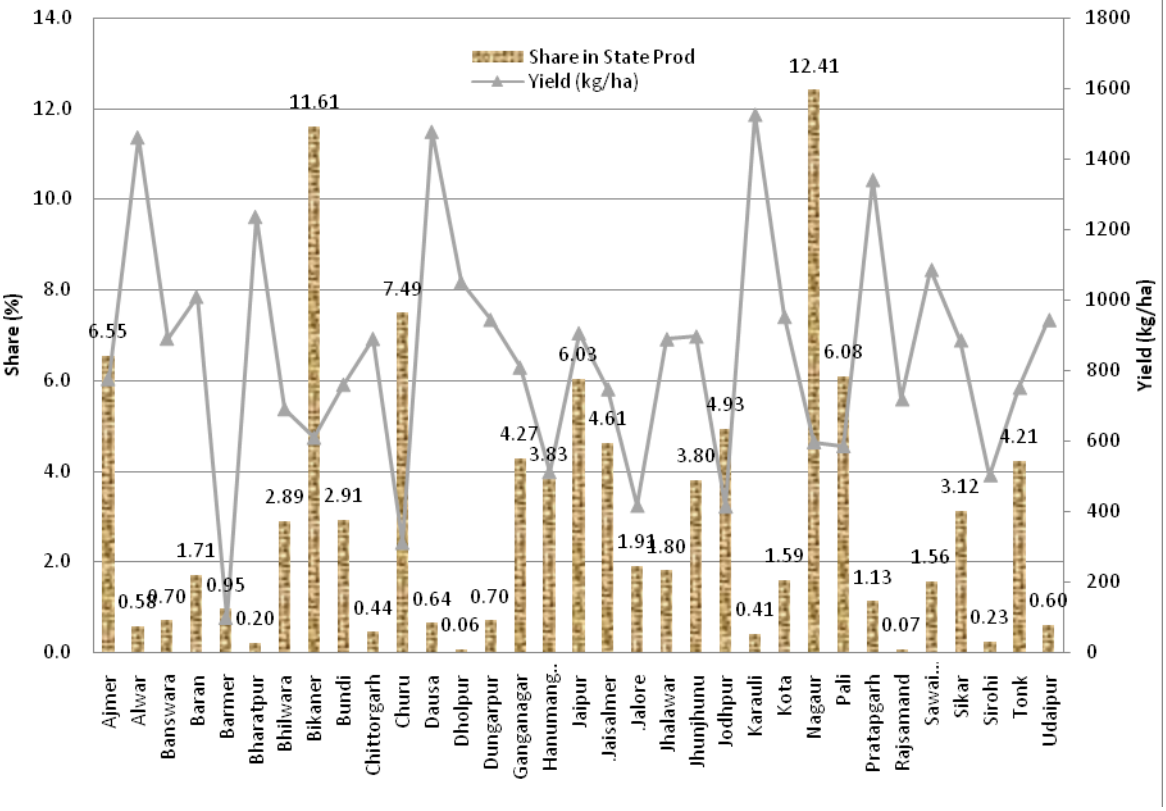


Table 2.4: District wise Production and Yield of Pulses Crop Area in Rajasthan (2016-17)

Sr. No.	District	Area		Production		Yield
		ha	% to total	tonnes	% to total	(kg/ha)
1	Ajmer	288470	5.02	223848	6.55	776
2	Alwar	13494	0.23	19706	0.58	1460
3	Banswara	26818	0.47	23870	0.70	890
4	Baran	58012	1.01	58515	1.71	1009
5	Barmer	331394	5.77	32577	0.95	98
6	Bharatpur	5540	0.10	6843	0.20	1235
7	Bhilwara	143237	2.49	98925	2.89	691
8	Bikaner	651351	11.34	396747	11.61	609
9	Bundi	130977	2.28	99470	2.91	759
10	Chittorgarh	17055	0.30	15172	0.44	890
11	Churu	821843	14.30	255968	7.49	311
12	Dausa	14893	0.26	21990	0.64	1477
13	Dholpur	1973	0.03	2072	0.06	1050
14	Dungarpur	25363	0.44	23923	0.70	943
15	Ganganagar	180762	3.15	146083	4.27	808
16	Hanumangarh	255864	4.45	130943	3.83	512
17	Jaipur	227532	3.96	205994	6.03	905
18	Jaisalmer	211077	3.67	157656	4.61	747
19	Jalore	156803	2.73	65276	1.91	416
20	Jhalawar	69295	1.21	61567	1.80	888
21	Jhunjhunu	144965	2.52	129889	3.80	896
22	Jodhpur	406565	7.08	168451	4.93	414
23	Karauli	9197	0.16	14025	0.41	1525
24	Kota	57015	0.99	54247	1.59	951
25	Nagaur	710530	12.37	424153	12.41	597
26	Pali	354922	6.18	207753	6.08	585
27	Pratapgarh	28751	0.50	38530	1.13	1340
28	Rajsamand	3121	0.05	2242	0.07	718
29	Sawai Madhopur	49045	0.85	53215	1.56	1085
30	Sikar	120659	2.10	106815	3.12	885
31	Sirohi	15711	0.27	7900	0.23	503
32	Tonk	191694	3.34	143934	4.21	751
33	Udaipur	21634	0.38	20399	0.60	943
	Raj State	5745562	100.00	3418698	100.00	595

2.4 Area, Production and Yield of Pulses in Rajasthan – District Level Analysis

The area and production of major crops at districts level in state on two period points viz. TE 2006-07 and TE 2016-17 is presented in Tables 2.5 and 2.6. Table 2.7 presents the growth rate in area and production of major crops at districts level. Baran, Bundi, Dausa, Jaisalmer, Kota, Pali, Udaipur and Sirohi have reported the significant growth in production and area under pulses.

Table 2.5: Area and Production of Major Crops at districts level in State (TE 2006-07)

District	Area and production of major crops at districts level in State (TE 2006-07) (Area in hectares, production in tones)									
	Rice		Coarse cereals		Wheat		Pulses		Food grains	
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
Ajmer	8.3	14.3	263559.3	158153.3	22841.7	57973.3	101701.0	38532.3	396081.0	301362.0
Alwar	182.3	331.3	271063.7	435155.7	180709.0	666364.7	14616.0	16768.7	481306.7	1173889.7
Banswara	33545.0	25939.3	144925.0	187486.0	84250.7	153973.3	42417.7	26206.3	306332.0	389271.7
Baran	3882.3	11408.0	21183.0	28744.0	96154.7	335811.3	6454.0	6354.3	128030.7	383139.7
Barmer	0.0	0.0	970686.7	146359.0	14560.0	20480.7	250871.0	38004.0	236178.0	205579.0
Bharatpur	1281.0	1506.0	154533.3	187247.7	146334.3	521807.0	6644.0	7107.3	312851.0	740619.0
Bhilwara	244.0	443.3	216245.7	319948.7	86589.0	242157.3	80542.3	38416.0	398089.7	644944.7
Bikaner	62.3	112.0	211356.3	93235.3	54504.7	117231.7	435478.3	169711.0	703909.7	384285.0
Bundi	16964.7	33698.3	36920.0	79069.0	119759.0	431202.7	25427.0	22158.7	199866.7	563070.0
Chittorgarh	612.3	1124.0	180845.7	404009.7	117763.3	398682.0	32068.7	22504.3	337084.7	842776.7
Churu	0.0	0.0	425570.0	247590.7	16906.3	25767.7	589035.0	211530.7	1035895.0	491849.3
Dausa	0.0	0.0	126550.7	218370.3	76927.7	222058.3	3993.3	3983.3	214804.7	464440.0
Dholpur	531.3	955.0	71374.7	126192.7	49878.7	165019.7	2880.3	3070.7	125685.0	297723.3
Dungarpur	23992.7	20233.3	85438.3	78744.0	33547.7	57331.3	29719.7	20349.3	173670.7	173156.3
Ganganagar	4260.7	12711.3	14030.3	26251.7	202852.3	713629.0	130248.7	106598.0	389009.0	979692.0
Hanumangarh	19320.0	78946.7	87991.7	141864.0	203322.0	639357.0	245322.0	125820.3	584236.3	1053607.7
Jaipur	0.0	0.0	337031.3	436372.0	134954.3	355468.7	102677.0	59551.3	621738.3	970891.7
Jaisalmer	0.0	0.0	131799.3	11926.3	10749.0	12020.7	58406.0	31612.0	201064.7	56736.0
Jalore	0.0	0.0	345236.7	227611.0	32825.0	56301.7	134116.7	54686.7	512501.3	339886.0
Jhalawar	1191.7	2186.0	47323.3	88297.0	62880.7	187769.0	37810.7	29875.3	149552.0	311764.3
Jhunjhunu	0.0	0.0	283108.3	268186.3	72023.3	235642.3	115704.0	86198.3	480932.7	617593.3
Jodhpur	0.0	0.0	611347.3	260473.0	40358.7	81461.0	259506.0	64061.3	914906.3	413455.7
Karauli	2059.0	3611.7	122024.3	207783.3	57704.0	194585.0	7885.7	8887.7	190161.3	414926.3
Kota	8972.7	25060.7	16125.0	22131.3	92737.3	338475.0	11375.7	8803.0	129685.0	392798.3
Nagaur	0.0	0.0	521952.7	440380.3	74350.3	166579.3	524817.0	217783.0	1100839.3	859197.7
Pali	0.0	0.0	213901.3	102966.7	59062.3	110718.7	106606.0	45550.7	382994.7	285666.0
Pratapgarh	598.3	1085.0	64342.0	110470.7	38578.0	113572.7	16236.7	11670.3	125376.3	252198.3
Rajsamand	60.3	110.3	70927.3	103389.7	34369.3	87888.7	7237.0	5367.0	113138.7	200548.7
Sawai Madhopur	21.3	38.7	221693.0	220885.7	74333.0	200999.3	81840.7	47652.7	394416.7	506261.0
Sikar	3.3	5.7	139805.3	181422.3	57065.7	150795.7	52411.0	35854.3	259991.0	396075.0
Sirohi	1.0	1.7	115324.7	80301.0	52727.0	130381.3	47719.3	19930.7	219180.7	244356.0
Tonk	3978.0	3327.0	175317.0	211399.3	69638.0	169277.7	47038.7	30055.7	305088.3	431491.7
Udaipur	1229.7	671.0	60560.0	81440.7	13705.0	28881.7	6947.0	4854.3	84242.7	118949.0
Raj State	123002.3	223520.7	5760093.3	5933858.3	2484962.0	7389665.3	3615754.0	1619509.7	6208840.7	5902201.0

Table 2.5 continues…

District	**Area and production of major crops at districts level in State (TE 2006-07)** (Area in lakh hectares, production in lakh tones)									
	Total Oilseeds		**Black Gram**		**Red Gram**		**Bengal Gram**		**Green Gram**	
	Area	**Prodn**	**Area**	**Prodn.**	**Area**	**Prodn.**	**Area**	**Prodn.**	**Area**	**Prodn.**
Ajmer	42553.7	19510.3	6740.0	2038.0	19.0	4.0	10812.7	5551.0	79981.3	29773.0
Alwar	258551.3	365785.7	6.0	2.3	1625.3	1451.7	12794.0	15167.3	34.3	13.3
Banswara	22232.7	10931.7	14251.3	4687.0	6616.3	3368.3	14569.7	14096.3	30.3	11.7
Baran	304470.3	299111.7	1333.3	640.7	73.7	46.3	4593.0	5322.0	267.3	100.7
Barmer	52777.0	33304.0	0.0	0.0	0.0	0.0	1100.0	930.7	49506.0	4496.7
Bharatpur	210855.0	297257.7	83.7	32.3	169.0	139.7	4616.7	5096.3	132.3	54.0
Bhilwara	90310.0	55990.3	37070.7	12949.3	4.0	2.7	18523.7	14703.7	19558.0	7018.0
Bikaner	116039.3	109037.7	0.3	0.3	1.0	1.7	155754.7	113993.3	2059.3	1040.0
Bundi	167877.0	152302.3	10136.7	6562.3	20.7	19.0	10002.3	11277.7	123.3	47.3
Chittorgarh	234123.0	197505.7	7483.3	1925.0	345.7	344.7	20570.7	17486.7	1255.0	470.3
Churu	41289.3	42964.3	0.3	0.0	0.0	0.0	281549.3	108972.3	31715.0	16558.0
Dausa	103785.7	115844.3	10.0	4.7	37.7	23.7	3595.3	3811.3	118.7	48.0
Dholpur	66444.3	91555.3	145.7	55.7	653.3	610.0	1820.0	2230.0	155.0	60.7
Dungarpur	2343.0	1154.7	11563.3	4406.7	2236.3	797.3	14231.0	13588.7	19.7	7.3
Ganganagar	280482.0	316936.7	614.3	229.7	97.0	212.7	106883.3	89977.3	20675.3	14658.7
Hanumangarh	123858.3	138379.7	98.7	36.0	26.7	14.3	193413.0	103993.7	12700.3	6395.3
Jaipur	184387.0	176046.3	592.0	272.3	260.0	365.0	16278.0	14663.7	70853.0	32297.0
.Jaisalmer	95046.0	48697.0	0.0	0.0	0.0	0.0	55248.0	31179.3	2753.0	337.7
.Jalore	165514.3	156458.7	1.0	0.3	2.0	0.7	8548.7	6896.7	90773.3	29216.0
Jhalawar	272011.3	217101.7	10766.0	5246.7	568.7	578.7	22117.0	20484.7	273.7	106.0
Jhunjhunu	93170.3	109988.7	0.0	0.0	0.0	0.0	69905.3	69975.7	19462.3	5854.3
Jodhpur	167086.0	138928.0	0.0	0.0	0.7	0.3	467.0	290.3	100996.0	33740.3
Karauli	99891.3	118563.3	24.7	9.3	456.7	639.0	7310.3	8206.0	14.3	5.7
Kota	222677.0	232403.7	6506.7	2920.3	32.3	18.7	4489.7	5644.7	261.7	99.0
Nagaur	129265.7	119739.0	0.3	0.0	0.0	0.0	21101.3	25962.3	243675.3	118398.7
Pali	166629.0	78172.7	102.3	39.7	129.0	67.7	19097.0	15600.0	82818.7	28834.3
Pratapgarh	43026.0	47841.7	2502.7	332.3	523.0	570.0	11075.3	9278.7	558.0	209.0
Rajsamand	126345.7	108622.7	2199.3	1164.0	418.7	417.0	4210.0	3608.0	305.0	124.0
Sawai Madhopur	151272.3	135846.0	951.3	409.7	109.7	109.7	27726.0	28131.0	9918.7	2600.3
Sikar	77192.3	77002.7	610.7	232.0	508.3	439.7	17835.3	19982.7	10683.0	4396.3
Sirohi	157753.0	121764.0	4848.7	2606.7	199.7	141.7	6148.7	4237.0	35699.7	12404.7
Tonk	125989.7	102587.3	8974.0	2261.7	2272.7	1790.0	17643.0	16039.3	14438.0	4343.7
Udaipur	8003.0	6173.0	2374.7	541.0	1123.0	1059.0	3124.7	2908.3	70.0	29.7
Raj State	4403252.0	4243508.3	129992.0	49606.0	18530.0	13233.0	1167154.7	809286.7	901885.0	353749.7

Table 2.6: Area and production of major crops at districts level in State (TE 2016-17)

District	Area and production of major crops at districts level in State (TE 2006-07) (Area in lakh hectares, production in lakh tones)									
	Rice		Coarse cereals		Wheat		Pulses		Food grains	
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
Ajmer	6.0	13.3	233533.0	159038.3	53400.7	144590.0	142374.3	128217.3	371931.3	486176.0
Alwar	300.7	650.7	292336.0	549720.3	215917.3	825280.3	9114.3	14425.3	432656.0	1421259.7
Banswara	28061.7	20643.0	134079.0	151332.3	85135.7	178443.0	21625.0	21851.0	217486.0	374462.0
Baran	16270.7	47484.0	15293.7	33760.0	165673.3	692916.0	31594.7	29314.7	226040.3	804307.3
Barmer	0.0	0.0	781407.3	147908.7	15259.7	18746.3	204384.0	44851.3	761569.0	211579.3
Bharatpur	1877.3	4262.3	158033.0	239645.0	162111.3	642724.7	3541.3	6010.7	276749.3	899621.0
Bhilwara	531.0	1147.3	205486.7	285599.0	122219.7	353071.3	92178.3	64559.7	380993.7	758602.7
Bikaner	19.3	41.7	97902.7	52799.7	115996.7	269025.0	455559.3	310510.7	645496.0	644226.3
Bundi	39583.0	94688.7	32882.7	89892.0	163384.3	573647.0	80963.7	68512.3	305742.7	829281.0
Chittorgarh	780.0	1418.3	114578.3	229164.7	143582.0	498474.7	11652.7	12163.3	242040.7	768365.7
Churu	0.0	0.0	282737.0	155023.7	33358.7	65947.0	464384.7	197367.0	689237.7	433433.7
Dausa	0.0	0.0	150192.3	225310.7	101914.0	379116.0	9992.0	19782.3	220847.0	643810.0
Dholpur	465.3	1012.0	83770.0	173765.3	65963.0	250261.0	1515.3	2003.7	124158.7	428969.7
Dungarpur	16790.0	14944.7	72226.0	80038.3	45715.0	87953.0	17112.7	22742.3	121004.3	208385.0
Ganganagar	12455.0	38154.7	6411.7	7662.3	259861.7	986320.3	109717.3	106882.7	439823.3	1313052.3
Hanumangarh	32059.0	99329.0	35119.0	28783.3	246388.3	943365.7	141367.3	92386.0	459467.7	1218747.7
Jaipur	0.0	0.0	341591.0	470117.0	155077.0	516468.3	123717.3	143648.3	566569.3	1315799.3
Jaisalmer	0.0	0.0	90492.3	14404.0	10940.3	13757.7	158191.3	116501.7	237101.0	144713.3
Jalore	0.0	0.0	311315.7	165394.7	41963.3	82262.3	90919.3	45438.7	347029.3	293959.0
Jhalawar	3636.7	7230.0	40653.0	75710.0	107894.3	374966.3	43702.3	39603.7	183452.3	498311.7
Jhunjhunu	0.0	0.0	223906.7	285450.7	87896.7	339733.0	97297.0	102802.0	344454.3	759085.7
Jodhpur	0.0	0.0	470375.7	390651.3	71645.3	149234.7	235823.0	163037.3	626299.0	703823.7
Karauli	1817.7	2462.3	126026.7	244211.7	84445.3	316320.0	4483.7	9621.0	174591.3	573218.7
Kota	20707.7	52269.7	5955.3	8403.7	132477.7	456922.0	27566.0	25294.7	185225.7	543690.0
Nagaur	0.0	0.0	414272.0	361616.7	65621.7	162314.7	413491.3	284500.3	750528.3	832032.0
Pali	0.0	0.0	156489.7	104880.7	67850.0	174445.0	187278.7	123597.3	356415.7	413251.0
Pratapgarh										
Rajsamand	928.7	2011.7	45961.3	66356.7	61607.0	209685.3	26953.7	33371.3	120232.0	315911.7
Sawai Madhopur	26.0	56.3	71883.0	107468.0	29315.0	82094.7	2074.0	1996.3	88286.0	207447.7
Sikar	1610.0	3421.0	63256.7	105920.3	78969.0	283940.0	25417.7	28749.7	149729.3	423755.3
Sirohi	0.0	0.0	278204.0	355876.3	94641.0	334765.7	79446.3	79714.3	391708.3	875589.7
Tonk	2.3	5.0	39518.0	40616.3	32862.0	87545.0	8701.3	5540.7	69596.3	136560.3
Udaipur	4.0	8.3	110871.0	97990.7	62342.7	183524.3	98947.0	90915.3	241853.7	383815.3
Raj State	177932.0	391254.0	5486760.3	5504512.3	3181429.7	0677860.3	3421087.0	2435913.0	0748315.7	9865243.7

Table 2.6 continues…

District	**Area and production of major crops at districts level in State (TE 2016-17)** (Area in lakh hectares, production in lakh tones)							
	Black Gram		**Red Gram**		**Bengal Gram**		**Green Gram**	
	Area	**Prodn.**	**Area**	**Prodn.**	**Area**	**Prodn.**	**Area**	**Prodn.**
Ajmer	25658.0	14794.0	1.0	0.3	83931.3	60080.0	93575.7	51530.7
Alwar	0.3	0.3	1481.7	1704.3	10596.7	11445.7	13.0	6.7
Banswara	10247.7	5192.3	4626.0	2435.7	12855.0	13456.0	17.3	8.7
Baran	23622.3	14353.7	13.3	11.3	9865.0	14622.7	310.3	150.3
Barmer	1.0	0.7	0.0	0.0	739.7	666.7	60553.7	9517.3
Bharatpur	65.7	35.0	139.3	137.7	4284.7	4671.7	50.0	24.3
Bhilwara	66905.7	25333.7	5.0	10.0	24106.3	22447.7	17845.0	6074.7
Bikaner	6.0	3.7	4.7	4.7	229754.0	195581.7	16638.3	11054.3
Bundi	64678.3	38860.3	26.3	19.3	3716.7	4680.3	164.3	78.0
Chittorgarh	6130.0	2333.7	5.0	1.3	5731.7	7163.3	485.7	234.3
Churu	0.7	0.3	0.0	0.0	183988.7	62242.3	99864.0	29224.3
Dausa	17.7	10.0	27.0	33.7	14918.3	19646.7	79.0	39.0
Dholpur	145.7	78.3	494.0	562.3	1106.3	1051.7	113.7	55.0
Dungarpur	11651.3	7491.0	1417.3	669.0	12104.7	14209.7	23.3	11.3
Ganganagar	357.3	135.7	1049.0	2094.3	72337.7	76864.7	44657.0	26974.0
Hanumangarh	58.0	31.3	626.7	262.3	92039.3	62731.7	27597.3	13210.3
Jaipur	753.0	421.3	436.0	282.0	77995.3	68071.3	91540.3	50620.3
.Jaisalmer	0.0	0.0	3.0	0.7	130817.3	106037.3	23946.7	9064.3
.Jalore	6.0	3.7	1.3	0.0	6273.7	7051.0	101182.3	35278.7
Jhalawar	23113.3	14207.7	111.3	61.7	12603.7	14615.7	125.7	61.0
Jhunjhunu	1.7	1.0	0.0	0.0	57474.0	66045.0	31137.3	17259.0
Jodhpur	5.7	3.7	0.0	0.0	8288.7	7852.7	182261.7	102710.0
Karauli	49.0	29.0	263.3	280.3	7325.0	9267.3	28.7	14.0
Kota	25843.7	18020.3	12.0	10.7	4290.3	6887.0	125.0	59.3
Nagaur	2.3	1.0	0.0	0.0	25881.0	20496.3	389323.3	215731.0
Pali	246.0	140.7	55.0	26.3	40267.3	49484.7	191554.7	73451.0
Pratapgarh								
Rajsamand	3831.3	2343.3	393.0	400.3	15088.3	18862.0	26.7	12.3
Sawai Madhopur	1257.7	665.7	0.0	0.0	796.3	801.7	690.7	333.3
Sikar	14376.0	9193.3	142.7	113.0	12443.7	17935.7	267.3	130.3
Sirohi	0.0	0.0	0.3	0.3	36814.3	40723.7	27561.0	17617.0
Tonk	1604.3	645.0	125.0	63.0	2943.7	2136.0	5666.7	2209.3
Udaipur	36926.3	20289.0	12.0	12.0	38180.0	35238.3	51834.3	29446.0
Raj State	317562.0	174618.7	11471.3	9196.7	1239558.7	1043068.0	1459260.0	702190.3

Table 2.7: Growth rate in Area and production of major crops at districts level

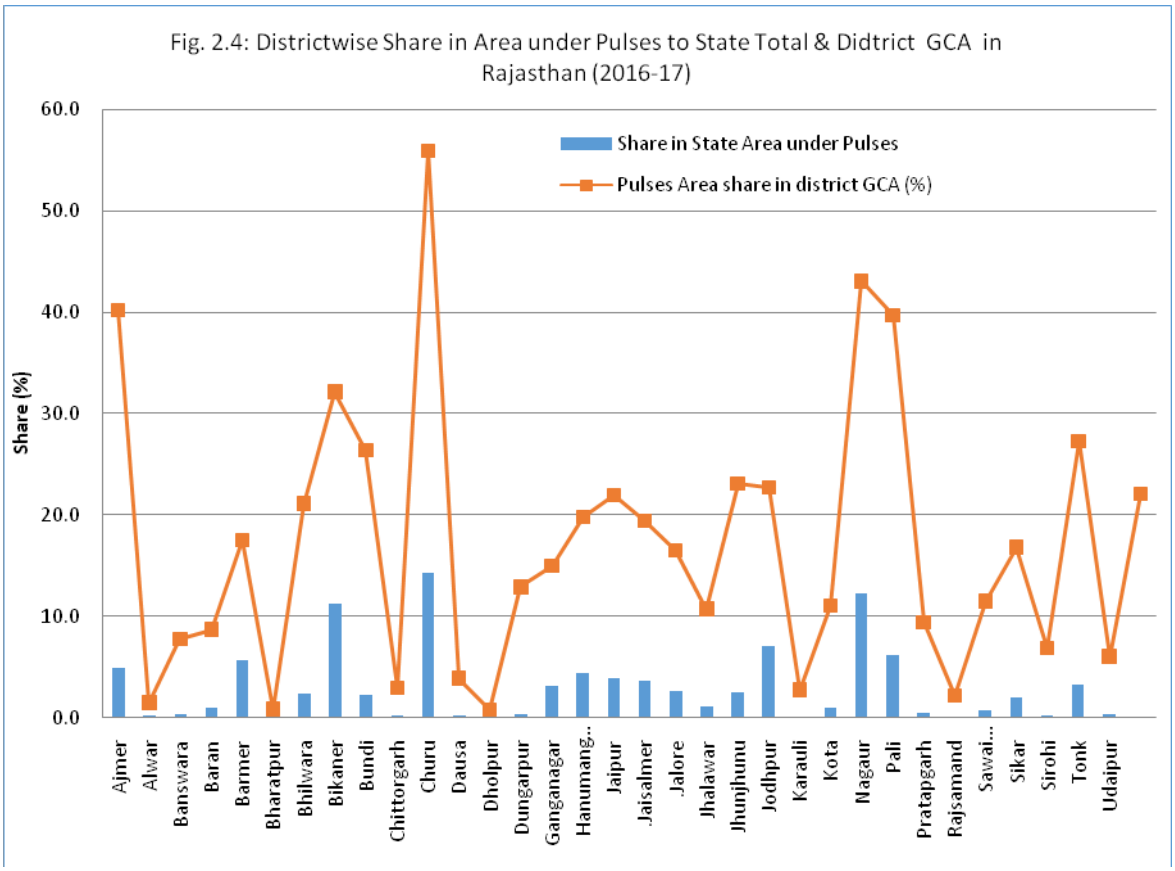
District	Growth rate in Area and production of major crops at districts level in State % (TE 2006-07 to TE 2016-17)									
	Rice		Coarse cereals		Wheat		Pulses		Food grains	
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
Ajmer	-2.8	-0.7	-1.1	0.1	13.4	14.9	4.0	23.3	-0.6	6.1
Alwar	6.5	9.6	0.8	2.6	1.9	2.4	-3.8	-1.4	-1.0	2.1
Banswara	-1.6	-2.0	-0.7	-1.9	0.1	1.6	-4.9	-1.7	-2.9	-0.4
Baran	31.9	31.6	-2.8	1.7	7.2	10.6	39.0	36.1	7.7	11.0
Barmer			-1.9	0.1	0.5	-0.8	-1.9	1.8	-3.8	0.3
Bharatpur	4.7	18.3	0.2	2.8	1.1	2.3	-4.7	-1.5	-1.2	2.1
Bhilwara	11.8	15.9	-0.5	-1.1	4.1	4.6	1.4	6.8	-0.4	1.8
Bikaner	-6.9	-6.3	-5.4	-4.3	11.3	12.9	0.5	8.3	-0.8	6.8
Bundi	13.3	18.1	-1.1	1.4	3.6	3.3	21.8	20.9	5.3	4.7
Chittorgarh	2.7	2.6	-3.7	-4.3	2.2	2.5	-6.4	-4.6	-2.8	-0.9
Churu			-3.4	-3.7	9.7	15.6	-2.1	-0.7	-3.3	-1.2
Dausa			1.9	0.3	3.2	7.1	15.0	39.7	0.3	3.9
Dholpur	-1.2	0.6	1.7	3.8	3.2	5.2	-4.7	-3.5	-0.1	4.4
Dungarpur	-3.0	-2.6	-1.5	0.2	3.6	5.3	-4.2	1.2	-3.0	2.0
Ganganagar	19.2	20.0	-5.4	-7.1	2.8	3.8	-1.6	0.0	1.3	3.4
Hanumangarh	6.6	2.6	-6.0	-8.0	2.1	4.8	-4.2	-2.7	-2.1	1.6
Jaipur			0.1	0.8	1.5	4.5	2.0	14.1	-0.9	3.6
Jaisalmer			-3.1	2.1	0.2	1.4	17.1	26.9	1.8	15.5
Jalore			-1.0	-2.7	2.8	4.6	-3.2	-1.7	-3.2	-1.4
Jhalawar	20.5	23.1	-1.4	-1.4	7.2	10.0	1.6	3.3	2.3	6.0
Jhunjhunu			-2.1	0.6	2.2	4.4	-1.6	1.9	-2.8	2.3
Jodhpur			-2.3	5.0	7.8	8.3	-0.9	15.5	-3.2	7.0
Karauli	-1.2	-3.2	0.3	1.8	4.6	6.3	-4.3	0.8	-0.8	3.8
Kota	13.1	10.9	-6.3	-6.2	4.3	3.5	14.2	18.7	4.3	3.8
Nagaur			-2.1	-1.8	-1.2	-0.3	-2.1	3.1	-3.2	-0.3
Pali			-2.7	0.2	1.5	5.8	7.6	17.1	-0.7	4.5
Pratapgarh	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
Rajsamand	143.9	172.3	-3.5	-3.6	7.9	13.9	27.2	52.2	0.6	5.8
Sawai Madhopur	2.2	4.6	-6.8	-5.1	-6.1	-5.9	-9.7	-9.6	-7.8	-5.9
Sikar			-5.5	-4.2	3.8	8.8	-5.2	-2.0	-4.2	0.7
Sirohi	-10.0	-10.0	14.1	34.3	7.9	15.7	6.6	30.0	7.9	25.8
Tonk	-10.0	-10.0	-7.7	-8.1	-5.3	-4.8	-8.2	-8.2	-7.7	-6.8
Udaipur	-10.0	-9.9	8.3	2.0	35.5	53.5	132.4	177.3	18.7	22.3
Raj State	4.5	7.5	-1.9	-0.7	2.8	4.4	-0.5	5.0	-1.9	2.5

Table 2.7 continues….

District	Growth rate in Area and production of major crops at districts level in State % (TE 2006-07 to TE 2016-17)									
	Total Oilseeds		**Black Gram**		**Red Gram**		**Bengal Gram**		**Green Gram**	
	Area	Prodn.	Area	Prodn.	Area	Prodn	Area	Prodn.	Area	Prodn.
Ajmer	4.0	18.4	28.1	62.6	-9.5	-9.2	67.6	98.2	1.7	7.3
Alwar	-0.9	0.1	-9.4	-8.6	-0.9	1.7	-1.7	-2.5	-6.2	-5.0
Banswara	13.0	13.7	-2.8	1.1	-3.0	-2.8	-1.2	-0.5	-4.3	-2.6
Baran	-0.3	-2.5	167.2	214.0	-8.2	-7.6	11.5	17.5	1.6	4.9
Barmer	0.5	1.2					-3.3	-2.8	2.2	11.2
Bharatpur	-0.3	1.0	-2.2	0.8	-1.8	-0.1	-0.7	-0.8	-6.2	-5.5
Bhilwara	-2.4	-0.6	8.0	9.6	2.5	27.5	3.0	5.3	-0.9	-1.3
Bikaner	10.8	21.3	170.0	100.0	36.7	18.0	4.8	7.2	70.8	96.3
Bundi	-2.3	-2.6	53.8	49.2	2.7	0.2	-6.3	-5.8	3.3	6.5
Chittorgarh	-2.1	-3.1	-1.8	2.1	-9.9	-10.0	-7.2	-5.9	-6.1	-5.0
Churu	14.1	15.8	10.0				-3.5	-4.3	21.5	7.6
Dausa	-2.1	-1.4	7.7	11.4	-2.8	4.2	31.5	41.5	-3.3	-1.9
Dholpur	-0.3	0.5	0.0	4.1	-2.4	-0.8	-3.9	-5.3	-2.7	-0.9
Dungarpur	101.6	117.9	0.1	7.0	-3.7	-1.6	-1.5	0.5	1.9	5.5
Ganganagar	-1.9	0.5	-4.2	-4.1	98.1	88.5	-3.2	-1.5	11.6	8.4
Hanumangarh	0.6	3.2	-4.1	-1.3	225.0	173.0	-5.2	-4.0	11.7	10.7
Jaipur	-1.9	-0.8	2.7	5.5	6.8	-2.3	37.9	36.4	2.9	5.7
.Jaisalmer	-2.4	1.6					13.7	24.0	77.0	258.4
.Jalore	1.1	3.4	50.0	100.0	-3.3	-10.0	-2.7	0.2	1.1	2.1
Jhalawar	0.6	-1.7	11.5	17.1	-8.0	-8.9	-4.3	-2.9	-5.4	-4.2
Jhunjhunu	-1.7	0.0					-1.8	-0.6	6.0	19.5
Jodhpur	8.7	13.3			-10.0	-10.0	167.5	260.5	8.0	20.4
Karauli	-0.1	1.4	9.9	21.1	-4.2	-5.6	0.0	1.3	10.0	14.7
Kota	0.0	-3.0	29.7	51.7	-6.3	-4.3	-0.4	2.2	-5.2	-4.0
Nagaur	-0.1	-1.9	60.0				2.3	-2.1	6.0	8.2
Pali	0.7	2.2	14.0	25.5	-5.7	-6.1	11.1	21.7	13.1	15.5
Pratapgarh	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0	-10.0
Rajsamand	0.9	-1.2	7.4	10.1	-0.6	-0.4	25.8	42.3	-9.1	-9.0
Sawai Madhopur	-9.7	-9.8	3.2	6.2	-10.0	-10.0	-9.7	-9.7	-9.3	-8.7
Sikar	17.6	20.9	225.4	386.3	-7.2	-7.4	-3.0	-1.0	-9.7	-9.7
Sirohi	-5.3	-2.6	-10.0	-10.0	-10.0	-10.0	49.9	86.1	-2.3	4.2
Tonk	-3.1	-1.8	-8.2	-7.1	-9.4	-9.6	-8.3	-8.7	-6.1	-4.9
Udaipur	362.1	560.0	145.5	365.0	-9.9	-9.9	112.2	111.2	7394.9	9915.6
Raj State	0.6	1.6	14.4	25.2	-3.8	-3.1	0.6	2.9	6.2	9.8

2.5 Share of Pulse at District level in district Gross Cropped Area

The share of area under pulses at district level to State total presented in Fig. 2.4 indicate that three top most districts having more than 11 per cent share each in total area at the State are Churu (14.3%), Nagaur (12.4%) and Bikaner (11.3%) mostly grown under rainfed condition. The data on district-wise share in area under pulses at district gross cropped area indicate that five topmost pulses growing districts were Churu having about 56 per cent of gross cropped area under pulses, followed by Nagaur (43%), Ajmer (40%), Pali (40%) and Bikaner (35%).



2.6 Share of Individual Pulses in Major districts in Total Pulses in Rajasthan

The share of individual pulses in major districts in total pulses in Rajasthan is presented in Table 2.8. It can be seen from the table that almost all districts have been contributing in total pulse production in the state. Major black gram growing districts are Bhilwara, Bundi, Udaipur, Kota and Ajmer, while red gram is grown in Banswara, Alwar, Dungarpur and Ganganagar. Bikaner, Chauru and Jaisalmer

has significant are under Bengal gram while green gram is mostly grown in Nagaur, Jodhpur, Pali, Ajmer, Chauru and Jaipur.

Table 2.8: Share of Individual Pulses in Major districts in Total Pulses in Rajasthan

District	**Share of Individual Pulses in Major districts in Total Pulses in Rajasthan**									
	Black Gram		**Red Gram**		**Bengal Gram**		**Green Gram**		Pulses	
	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.	Area	Prodn.
Ajmer	8.08	8.47	0.01	0.00	6.77	5.76	6.41	7.34	3.46	2.45
Alwar	0.00	0.00	12.92	18.53	0.85	1.10	0.00	0.00	4.03	7.15
Banswara	3.23	2.97	40.33	26.48	1.04	1.29	0.00	0.00	2.02	1.89
Baran	7.44	8.22	0.12	0.12	0.80	1.40	0.02	0.02	2.10	4.05
Barmer	0.00	0.00	0.00	0.00	0.06	0.06	4.15	1.36	7.09	1.07
Bharatpur	0.02	0.02	1.21	1.50	0.35	0.45	0.00	0.00	2.57	4.53
Bhilwara	21.07	14.51	0.04	0.11	1.94	2.15	1.22	0.87	3.54	3.82
Bikaner	0.00	0.00	0.04	0.05	18.54	18.75	1.14	1.57	6.01	3.24
Bundi	20.37	22.25	0.23	0.21	0.30	0.45	0.01	0.01	2.84	4.17
Chittorgarh	1.93	1.34	0.04	0.01	0.46	0.69	0.03	0.03	2.25	3.87
Churu	0.00	0.00	0.00	0.00	14.84	5.97	6.84	4.16	6.41	2.18
Dausa	0.01	0.01	0.24	0.37	1.20	1.88	0.01	0.01	2.05	3.24
Dholpur	0.05	0.04	4.31	6.11	0.09	0.10	0.01	0.01	1.16	2.16
Dungarpur	3.67	4.29	12.36	7.27	0.98	1.36	0.00	0.00	1.13	1.05
Ganganagar	0.11	0.08	9.14	22.77	5.84	7.37	3.06	3.84	4.09	6.61
Hanumangarh	0.02	0.02	5.46	2.85	7.43	6.01	1.89	1.88	4.27	6.14
Jaipur	0.24	0.24	3.80	3.07	6.29	6.53	6.27	7.21	5.27	6.62
Jaisalmer	0.00	0.00	0.03	0.01	10.55	10.17	1.64	1.29	2.21	0.73
Jalore	0.00	0.00	0.01	0.00	0.51	0.68	6.93	5.02	3.23	1.48
Jhalawar	7.28	8.14	0.97	0.67	1.02	1.40	0.01	0.01	1.71	2.51
Jhunjhunu	0.00	0.00	0.00	0.00	4.64	6.33	2.13	2.46	3.20	3.82
Jodhpur	0.00	0.00	0.00	0.00	0.67	0.75	12.49	14.63	5.83	3.54
Karauli	0.02	0.02	2.30	3.05	0.59	0.89	0.00	0.00	1.62	2.89
Kota	8.14	10.32	0.10	0.12	0.35	0.66	0.01	0.01	1.72	2.74
Nagaur	0.00	0.00	0.00	0.00	2.09	1.97	26.68	30.72	6.98	4.19
Pali	0.08	0.08	0.48	0.29	3.25	4.74	13.13	10.46	3.32	2.08
Pratapgarh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rajsamand	1.21	1.34	3.43	4.35	1.22	1.81	0.00	0.00	1.12	1.59
Sawai Madhopur	0.40	0.38	0.00	0.00	0.06	0.08	0.05	0.05	0.82	1.04
Sikar	4.53	5.26	1.24	1.23	1.00	1.72	0.02	0.02	1.39	2.13
Sirohi	0.00	0.00	0.00	0.00	2.97	3.90	1.89	2.51	3.64	4.41
Tonk	0.51	0.37	1.09	0.69	0.24	0.20	0.39	0.31	0.65	0.69
Udaipur	11.63	11.62	0.10	0.13	3.08	3.38	3.55	4.19	2.25	1.93
Raj State	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

2.7 District wise distribution of Seed Minikit in Rajasthan

The district-wise distribution of seed minikits during 2017-18 and 2018-19 is presented in Table 2.9. It can be seen from the table that during kharif seasons, two pulse crop minikits viz. Green gram and Black Gram were distributed to the farmers under this scheme. The highest number of minikits of both kharif pulse crops together for both years were distributed in Nagaur district (22.3% of total minikits) followed by Ajmer (8.42%), Jodhapur (8.23%), Jaipur (8.18%), Pali (7.71%), Tonk (6.38%), and Jalore (6.18%). These seven districts accounts for two third of seed minikits distributed of moog and urad together.

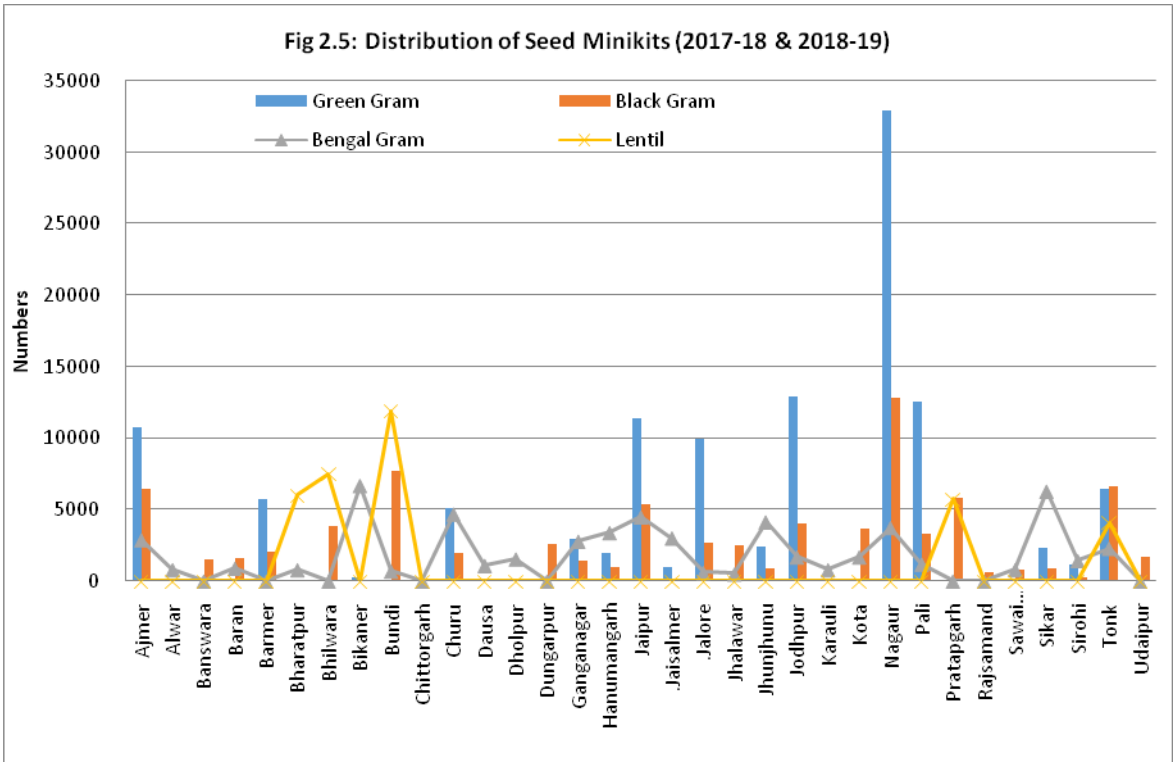
Table 2.9: District wise distribution of Seed Minikit in the State (Numbers)

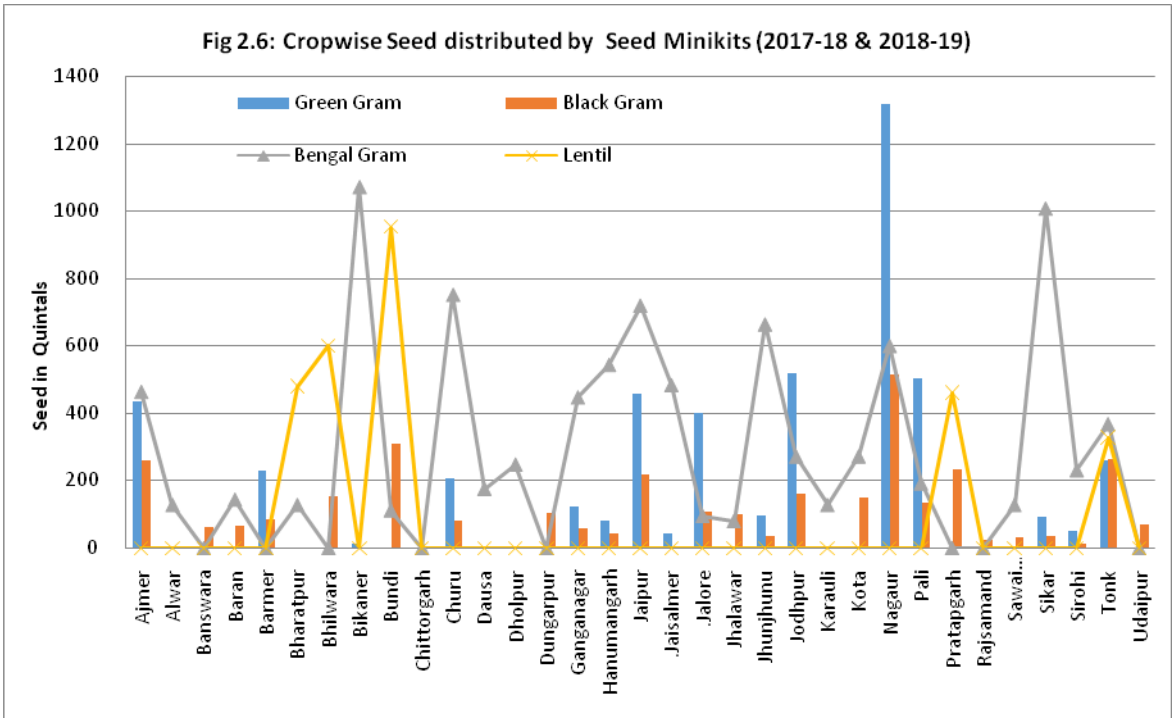
District	District wise distribution of Seed Minikit in the State (Numbers)					
	Green Gram			Black Gram		
	Kharif 2017	Kharif 2018	Total	Kharif 2017	Kharif 2018	Total
Ajmer	4000	6800	10800	6500	0	6500
Alwar	0	0	0	0	0	0
Banswara	0	0	0	1500	0	1500
Baran	0	0	0	1100	500	1600
Barmer	2100	3600	5700	2100	0	2100
Bharatpur	0	0	0	0	0	0
Bhilwara	0	0	0	900	2950	3850
Bikaner	0	300	300	0	0	0
Bundi	0	0	0	5700	2000	7700
Chittorgarh	0	0	0	0	0	0
Churu	2000	3100	5100	2000	0	2000
Dausa	0	0	0	0	0	0
Dholpur	0	0	0	0	0	0
Dungarpur	0	0	0	1600	1000	2600
Ganganagar	1400	1600	3000	1400	0	1400
Hanumangarh	1000	1000	2000	1000	0	1000
Jaipur	5400	6000	11400	5400	0	5400
Jaisalmer	0	1000	1000	0	0	0
Jalore	2700	7300	10000	2700	0	2700
Jhalawar	0	0	0	1500	1000	2500
Jhunjhunu	900	1500	2400	900	0	900
Jodhpur	4000	8900	12900	4000	0	4000
Karauli	0	0	0	0	0	0
Kota	0	0	0	1700	2000	3700
Nagaur	12800	20126	32926	12800	0	12800
Pali	3300	9240	12540	3300	0	3300
Pratapgarh	0	0	0	4100	1730	5830
Rajsamand	0	0	0	600	0	600
Sawai Madhopur	0	0	0	800	0	800
Sikar	900	1400	2300	900	0	900
Sirohi	300	900	1200	300	0	300
Tonk	3500	3000	6500	6600	0	6600
Udaipur	0	0	0	1000	730	1730
Raj State	45000	75766	120766	74400	10180	84580

Table 2.9 continues…..

District	District wise distribution of Seed Minikit in the State (Numbers)					
	Bengal Gram			Lentil		
	Rabi 2018	Rabi 2019	Total	Rabi 2018	Rabi 2019	Total
Ajmer	1400	1500	2900	0	0	0
Alwar	300	500	800	0	0	0
Banswara	0	0	0	0	0	0
Baran	400	500	900	0	0	0
Barmer	0	0	0	0	0	0
Bharatpur	300	500	800	2000	4000	6000
Bhilwara	0	0	0	3000	4500	7500
Bikaner	2500	4200	6700	0	0	0
Bundi	100	600	700	3400	8500	11900
Chittorgarh	0	0	0	0	0	0
Churu	3200	1500	4700	0	0	0
Dausa	300	800	1100	0	0	0
Dholpur	300	1250	1550	0	0	0
Dungarpur	0	0	0	0	0	0
Ganganagar	1098	1700	2798	0	0	0
Hanumangarh	1600	1800	3400	0	0	0
Jaipur	1000	3500	4500	0	0	0
Jaisalmer	1200	1825	3025	0	0	0
Jalore	300	300	600	0	0	0
Jhalawar	0	500	500	0	0	0
Jhunjhunu	1200	2950	4150	0	0	0
Jodhpur	1500	200	1700	0	0	0
Karauli	300	500	800	0	0	0
Kota	500	1200	1700	0	0	0
Nagaur	700	3050	3750	0	0	0
Pali	600	600	1200	0	0	0
Pratapgarh	0	0	0	2250	3500	5750
Rajsamand	0	0	0	0	0	0
Sawai Madhopur	300	500	800	0	0	0
Sikar	800	5500	6300	0	0	0
Sirohi	300	1145	1445	0	0	0
Tonk	800	1500	2300	1100	3000	4100
Udaipur	0	0	0	0	0	0
Raj State	20998	38120	59118	11750	23500	35250

While in case of rabi pulses (Bengal Gram and Lentil), the highest number of minikits of both rabi pulse crops together for both years were distributed in Bundi district (13.35% of total minikits) followed by Bhilwara 7.95%), Bharatpur (7.21%), Bikaner (7.10%), Tonk (6.78%), Sikar (6.68%), and Pratagarh (6.09%). These seven districts accounts for 55 per cent of total seed minikits distributed.





2.8 Summary of the Chapter

Rajasthan State holds second position after Madhya Pradesh and accounts for 13.4 per cent in total national pulses stock having 17.8 per cent of national area under pulses (5.33 mha), while lower area under coverage (21 per cent) resulted in low level of productivity of pulses of 635 kg/ha as compared to 841 kg/ha at national level. The share of the cultivable area to total geographical area is about 75 per cent which is almost same during the two period points, i.e. TE 2006-7 and TE 2016-17. While share of the area under pulses to total cultivable area has increased from 13.4 per cent to almost 17 per cent during the corresponding two period points. Thus over the period of one decade, area under pulses has increased by 3.6 per cent points. Bundi, Pali, Ajmer and Tonk district has registered the significant increase in share of area under pulses to cultivable area during two points period. Nagaur district is the largest producer of pulses (12.41%) followed Bikaner (11.61%), Churu (7.49%), Ajmer (6.55%), Pali and Jaipur (6 % each), while Bundi contributes about 3 per cent share in state pulses production during 2016-17.

The three top most districts having more than 11 per cent share each in total area at the State are Churu (14.3%), Nagaur (12.4%) and Bikaner (11.3%). The data on district-wise share in area under pulses at district gross cropped area indicate that five top most pulses growing districts were Churu having about 56 per cent of gross cropped area under pulses, followed by Nagaur (43 per cent), Ajmer (40%), Pali (40%) and Bikaner (35%).

The district-wise distribution of seed minikits during 2017-18 and 2018-19 shows that during kharif seasons, two pulse crop minikits viz. Green gram and Black Gram were distributed to the farmers and the highest number of minikits of both kharif pulse crops together for both years were distributed in Nagaur district, while in case of rabi pulses (Bengal Gram and Lentil), the highest number of minikits of both rabi pulse crops together for both years were distributed in Bundi district (13.35% of total minikits).

The next chapter presents household characteristics, cropping pattern and value of output of beneficiary farmers.

Chapter III

Household Characteristics, Cropping Pattern and Value of Output of Beneficiary Farmers

3.1. Socio-economic Characteristics of the beneficiary Farmers:

The various socio-economic factors for instance size of family, age and education of respondent, social group, experience in farming, farm income, etc have direct influence on decision to whether they want to expand and improve crop productivity. The socio-economic characteristics of selected sample households are presented in Table 3.1. It can be seen from this table that the average size of the household was estimated to be 6 persons, while marginal land group households found to be the smallest (5.63) and the large group land holders had the largest family size (6.68). As per the specification and selection of beneficiary of the scheme (women criteria), three forth of the total respondents were women[1]. The age range of more than 80 per cent of total selected household respondent was 30-60 years while around 9 per cent were from young group (less than 30 years) and rest were from above 60 age group (11%), while across the groups, near about same trend was observed. In case of education status, majority of the respondents were found to be to be illiterate[2] (56.67%). Around one third of the total household respondents were educated mostly up to the SSC level. This indicate the lower education status of the respondents in Rajasthan in general, women in particular. Around 60 percent of total family members were engaged in farming and average farming experience was estimated to be about 25 years. Thus, selected households had quite a long and rich experience of farming. As per the scheme guidelines, the minikits are distributed to farmers on the basis of priority to Scheduled caste, Schedule tribe, small, marginal and below poverty line farmers, selected sample households confirmed the same. At overall level, about 49 per cent

[1] As per eligibility criteria for the scheme, minikits are given to women farmers even if land owner is her husband/father/father in laws. One minikit is given to only one woman in a family. Though the most of the information was provided by the male family members of respective household along with female beneficiary, as per list, beneficiary woman who gave information with her family members was considered as a respondent.

[2] As per Census 2011, male literacy rate was 79.19 % (7+ years) however the female literacy was 52.12 % (7+ years) in Rajasthan.

households were from other backward classes group followed by about 38 per cent from SC, about 10 percent from ST and rest were from open category. Among the selected marginal land holders group, about 69 per cent households together belonged to SC and ST category. Majority of households have agriculture as a main occupation while agriculture labour and allied was subsidiary occupation. The average income from agriculture and allied activities is estimated to be Rs. 118383/- while same was Rs. 35597/- from non-agricultural sources.

Table 3.1: Demographic Profile of the Selected Farmers (% of households)

Characteristics		**Marginal**	**Small**	**Medium**	**Large**	**Total**
No of HH		92	81	86	41	300
Share of HH in Total HH (%)		30.67	27.00	28.67	13.67	100.00
Household size (av. numbers)		5.63	6.12	6.16	6.68	6.06
Share of Beneficiary/ Non Beneficiary hh (%)	Beneficiary	81.5	76.5	55.8	36.6	66.7
	Non-Beneficiary	18.5	23.5	44.2	63.4	33.3
Gender of Beneficiary (%)	Male	0.00	0.00	0.00	0.00	0.00
	Female	100.0	100.0	100.0	100.0	100.0
Gender of Respondents – all (%)	Male	15.22	20.99	41.86	12.20	24.00
	Female	84.78	79.01	58.14	87.80	76.00
Age of the Respondent (%)	<30	10.87	13.58	3.49	4.88	8.67
	30-60	79.35	77.78	87.21	75.61	80.67
	>60	9.78	8.64	9.30	19.51	10.67
Education status of Respondent, number of years of education (%)	Illiterate	65.22	60.49	48.84	46.34	56.67
	Up to Primary (5)	14.13	24.69	24.42	17.07	20.33
	Up to Middle (8)	10.87	7.41	11.63	9.76	10.00
	Up to Matric (10)	3.26	6.17	4.65	14.63	6.00
	Up to + 2	3.26	1.23	6.98	4.88	4.00
	Up to graduate	3.26	0.00	3.49	7.32	3.00
	Above graduate	0.00	0.00	0.00	0.00	0.00
Family doing farming	Av numbers	3.43	3.64	3.65	3.63	3.58
Farming experience	Av in years	22.58	22.46	26.23	27.49	24.26
Caste (% of households)	SC	58.70	39.51	27.91	7.32	37.67
	ST	9.78	12.35	10.47	2.44	9.67
	OBC	27.17	44.44	59.30	82.93	48.67
	General	4.35	3.70	2.33	7.32	4.00
Main occupation of respondent (%)	Agriculture and allied	58.70	74.07	87.21	82.93	74.33
	Agricultural labour	35.87	20.99	9.30	4.88	20.00
	Non-agril. labour	2.17	2.47	0.00	0.00	1.33
	Self business/services	2.17	0.00	3.49	4.88	2.33
	Salaried/pensioners	1.09	2.47	0.00	7.32	2.00
	Others	0.00	0.00	0.00	0.00	0.00
Subsidiary occupation of respondent (%) (few are not responded to this question)	Agriculture and allied	41.30	25.93	12.79	17.07	25.67
	Agricultural labour	40.22	44.44	31.40	17.07	35.67
	Non-agril. labour	6.52	6.17	13.95	2.44	8.00
	Self business/services	7.61	8.64	3.49	9.76	7.00
	Salaried/pensioners	0.00	0.00	0.00	4.88	0.67
	Others	0.00	0.00	0.00	0.00	0.00
Av Annual Income (Rs.)	Agriculture & allied	71413	93864	130023	247805	118383
	Non-agril. Sources	25543	34432	31512	69024	35597

Note: Marginal farmer: 0-2.5 acres; Small Farmers: 2.51-5.00 acres; Medium: 5.01-10.00 acres; Large >10 acres

3.2. Characteristics of Operational Holdings

The average operational land holding of the selected household was about 6.11 acre having around 40 percent land under irrigation (net) at overall level (Table 3.2). Across land size groups, 71 percent of land of marginal farmers was under irrigation, followed by 45 per cent land of small, 41 per cent land of medium and 29 per cent of land of large farm group has irrigation facility. Thus, more the land, less the area under irrigated and vice versa. Same the case of cropping intensity wherein highest cropping intensity was recorded by marginal farmers and the lowest was in case of large farmer, with average cropping intensity of 138 per cent. The average rental value of land was observed to be Rs. 6000/- for irrigated land in Bundi district while Rs. 2500/- per acre in rainfed areas of Naguar district. While most of land leased in land was on share cropping basis.

Table 3.2: Characteristics of Operational Holdings (acres per household)

Farm size	Owned land (acre)	Non cultivable (acre)	Leased-in (acre)	Leased –out (acre)	Average Rental (Rs/Acre.)		NOA (acre)	Net Irrigated area	GCA (acre)	Cropping intensity (%)
	1	2	3	4	5.1	5.2	6	7		8
Marginal	1.63	0.00	0.12	0.00	SC 11	--	1.74	1.24	2.94	168.66
Small	4.01	0.14	0.13	0.00	SC-5	6000/-	4.00	1.81	5.73	143.48
Medium	7.26	0.08	0.16	0.00	SC-4	-	7.33	3.00	10.27	140.08
Large	17.09	0.05	0.48	0.00	SC-1	2500/-	17.52	5.02	22.22	126.80
Total	6.00	0.07	0.18	0.00	SC-21	-	6.11	2.42	8.43	137.97

Note: SC- Share cropping (mixed with resources use and sharing of output at different ratio such as 50:50; 75:25, etc). Rs. 6000 per acre in case of irrigated land in Bundi district while Rs. 2500/- for rainfed land in Naguar district.

3.3 Sources of Irrigation:

The topmost source of the irrigation was groundwater (dug-well and bore-well) irrigating more than 80 per cent of total irrigated land at overall level (for details see Annexure I). The average water charges rates prevailing in the study area was Rs. 3125/- per acre water (Table 3.3).

Table 3.3: Source of Irrigation of Net Operated Area (%)

Farm size	Only canal (%)	Bore well (%)	Dug well (%)	Tank (%)	Others (%)	Rain fed area (%)	Av. Water Charges* (Rs/acre)	Total operated area (%)
Marginal	19.7	37.3	5.4	0.0	8.8	28.7	3125.0	100.0
Small	14.5	23.8	0.0	0.0	7.1	54.8	3125.0	100.0
Medium	13.9	16.8	0.0	0.0	10.3	59.1	3125.0	100.0
Large	5.5	19.3	0.0	0.0	3.9	71.3	3125.0	100.0
Total	11.2	20.8	0.5	0.0	7.1	60.4	3125.0	100.0

Notes: **Multiple sources of irrigation in few cases.** Canal irrigation is only in Bundi district and farmers using rented water with rate of Rs. 1250/- per bigha; Others includes farm pond.

3.4 Cropping Pattern:

The details on cropping pattern of selected households under irrigated and rainfed condition as well as overall condition is presented in Tables 3.4 to 3.6 & Figures 3.1 to 3.3.

Table 3.4: Cropping pattern (Irrigated Crops) of Selected Farmers

(% of GCA for the reference year 2018-19)

Crops	MF	SF	MDF	LF	Grand Total
Rice	1.17	0.68	0.27	0	0.34
Bajra	0	0.43	0.85	0.52	0.56
Barley	0.66	0.77	0	0	0.21
Jowar	0	0.34	0.09	0	0.09
Maize	13.68	7.67	4.75	1.26	4.98
Wheat	13.42	9.33	5.35	4.19	6.53
Coarse Cereals	**14.34**	**9.2**	**5.69**	**1.78**	**5.85**
Total Cereals	**28.93**	**19.21**	**11.31**	**5.97**	**12.72**
Moong	0	0.43	2.46	3.43	2.17
Moth	0	0	0	0	0
Udad	17.89	12.44	14.04	3.95	10.52
Lentil	8.85	5.32	2.87	0.35	3.05
Gram	8.19	3.75	7.63	1.17	4.65
Total Pulses	**34.93**	**21.93**	**27**	**8.9**	**20.4**
Total Foodgrains	**63.86**	**41.14**	**38.3**	**14.87**	**33.12**
Groundnut	0	0.09	0.04	0	0.03
Sesamum	0.15	0	0.18	0.09	0.11
Soyabean	3.37	3.75	2.64	0.69	2.22
Leenseed	0	0	0.09	0	0.03
Rapeseed & Mustard	5.63	10.26	10.07	4.12	7.49
Total Oilseeds	**9.14**	**14.1**	**13.03**	**4.91**	**9.88**
Bajra (Foddar)	0	0	0	0	0
Fodder (Jowar)	3.95	2.09	2.51	2.26	2.49
Razka	0.51	0.13	0.09	0	0.11
Total Fodder	**4.46**	**2.21**	**2.6**	**2.26**	**2.60**
Brinjal(Vegetable)	0	0.09	0.02	0	0.02
Carrot	0	0.17	0	0	0.03
Cauliflower	0	0.09	0	0	0.02
Chilly	0	0.17	0	0	0.03
Ladyfinger	0.29	0.09	0	0	0.05
Lemon	0	0	0	0	0
Spniz (Vegetable)	0	0	0.02	0	0.01
Tomato	0.15	0	0	0	0.02
Onion	0.22	0	0	0	0.02
Pea	1.21	0.51	0.38	0	0.36
Potato	0.15	0	0	0	0.02
Total Vegetables	2.01	1.11	0.43	0	0.57
Cumin	0	0.43	1.52	6.3	2.88
Garlic	0.44	0	0	0	0.05
Isabgol	0	0	0	1.69	0.61
Sonf	0	0	0	1.69	0.61
Turmaric	0.15	0.26	0	0	0.06
Total Condiments & Spices	**0.59**	**0.68**	**1.52**	**9.68**	**4.21**
Cotton	0.29	0	0	5.34	1.95
Flower(Genda)	0.59	0	0	0	0.06
Guar	0	0.43	0	0.78	0.36
Sugarcane	0.15	0.94	0.13	0	0.23
Gross Cropped area (Irrigated)	**81.09**	**60.6**	**56.01**	**37.84**	**52.99**
Gross Cropped area (Acre)	**270.34**	**464.34**	**883.39**	**910.98**	**2529.05**

Table 3.5: Cropping pattern (Unirrigated Crops) of Selected Farmers

(% of GCA for the reference year 2018-19)

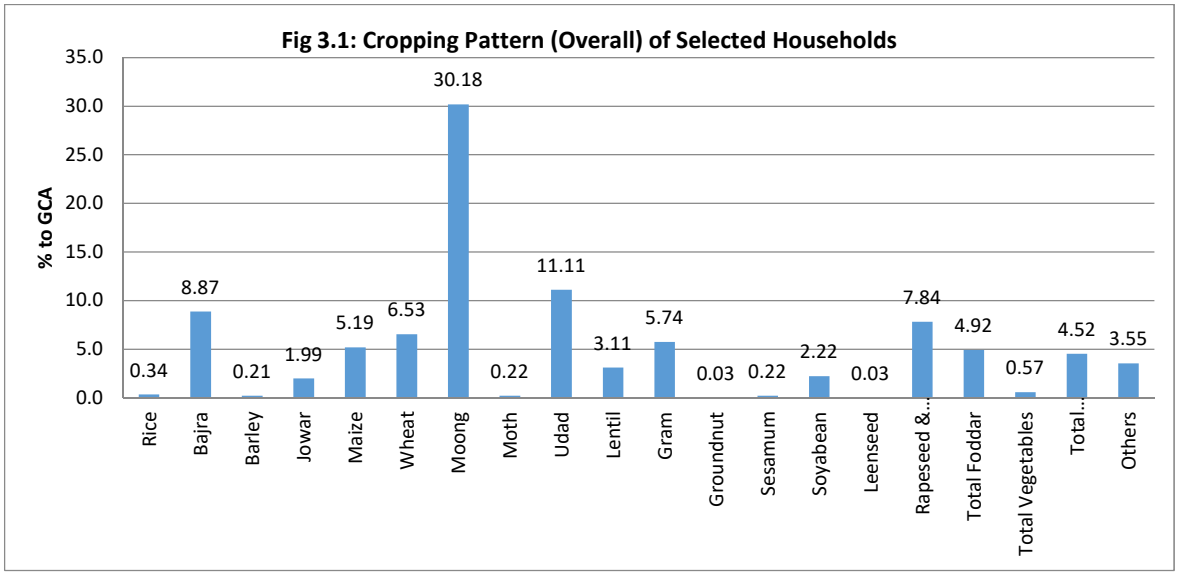
Crops	MF	SF	MDF	LF	Grand Total
Rice	0	0	0	0	0
Bajra	1.46	9.16	7.28	10.98	8.34
Barley	0	0	0	0	0
Jowar	0.59	1.19	2.51	2.04	1.89
Maize	0	0.94	0.11	0	0.21
Wheat	0	0	0	0	0
Coarse Cereals	**2.05**	**11.29**	**9.89**	**13.03**	**10.44**
Total Cereals	**2.05**	**11.29**	**9.89**	**13.03**	**10.44**
Moong	13.24	21.42	26.95	36.75	28
Moth	0	0	0.09	0.52	0.22
Udad	1.39	1.19	0.63	0	0.59
Lentil	0.33	0.13	0	0	0.06
Gram	1.17	1.36	1.1	0.91	1.09
Total Pulses	**16.13**	**24.11**	**28.77**	**38.19**	**29.95**
Total Foodgrains	**18.18**	**35.39**	**38.66**	**51.21**	**40.39**
Groundnut	0	0	0	0	0
Sesamum	0	0	0.18	0.22	0.14
Soyabean	0	0	0	0	0
Linseed	0	0	0	0	0
Rapeseed & Mustard	0.29	0	0	0.87	0.34
Total Oilseeds	**0.29**	**0**	**0.18**	**1.09**	**0.48**
Bajra (Fodder)	0	0	0.22	0	0.08
Fodder (Jowar)	0.44	0.68	2.37	4.99	2.8
Razka	0	0	0	0	0
Total Fodder	**0.44**	**0.68**	**2.6**	**4.99**	**2.88**
Brinjal(Vegetable)	0	0	0	0	0
Carrot	0	0	0	0	0
Cauliflower	0	0	0	0	0
Chilly	0	0	0	0	0
Ladyfinger	0	0	0	0	0
Lemon	0	0	0	0.27	0.1
Spniz (Vegetable)	0	0	0	0	0
Tomato	0	0	0	0	0
Onion	0	0	0	0	0
Pea	0	0	0	0	0
Potato	0	0	0	0	0
Total Vegetables	0	0	0	0.27	0.1
Cumin	0	0.43	0.67	0	0.31
Garlic	0	0	0	0	0
Isabgol	0	0	0	0	0
Sonf	0	0	0	0	0
Turmaric	0	0	0	0	0
Total Condiments & Spices	**0**	**0.43**	**0.67**	**0**	**0.31**
Cotton	0	0	0	0	0
Flower(Genda)	0	0	0	0	0
Guar	0	2.9	1.88	4.6	2.85
Sugarcane	0	0	0	0	0
Gross Cropped area (Unirrigated)	**18.91**	**39.4**	**43.99**	**62.16**	**47.01**
Gross Cropped area (Acre)	**270.34**	**464.34**	**883.39**	**910.98**	**2529.05**

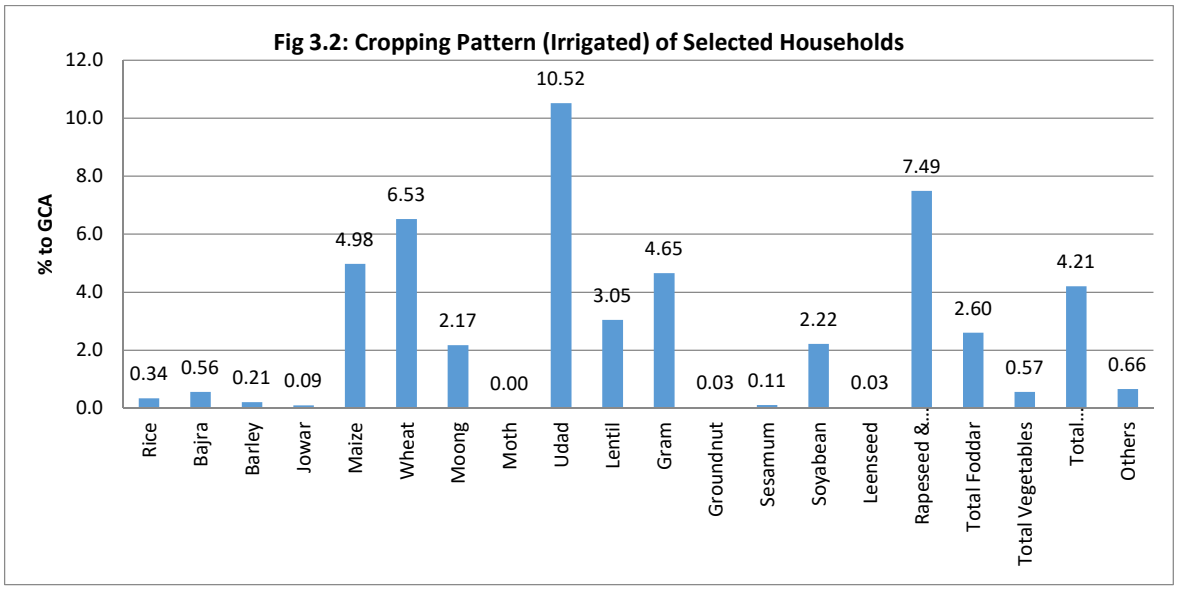
Table 3.6: Cropping Pattern of Selected Farmers

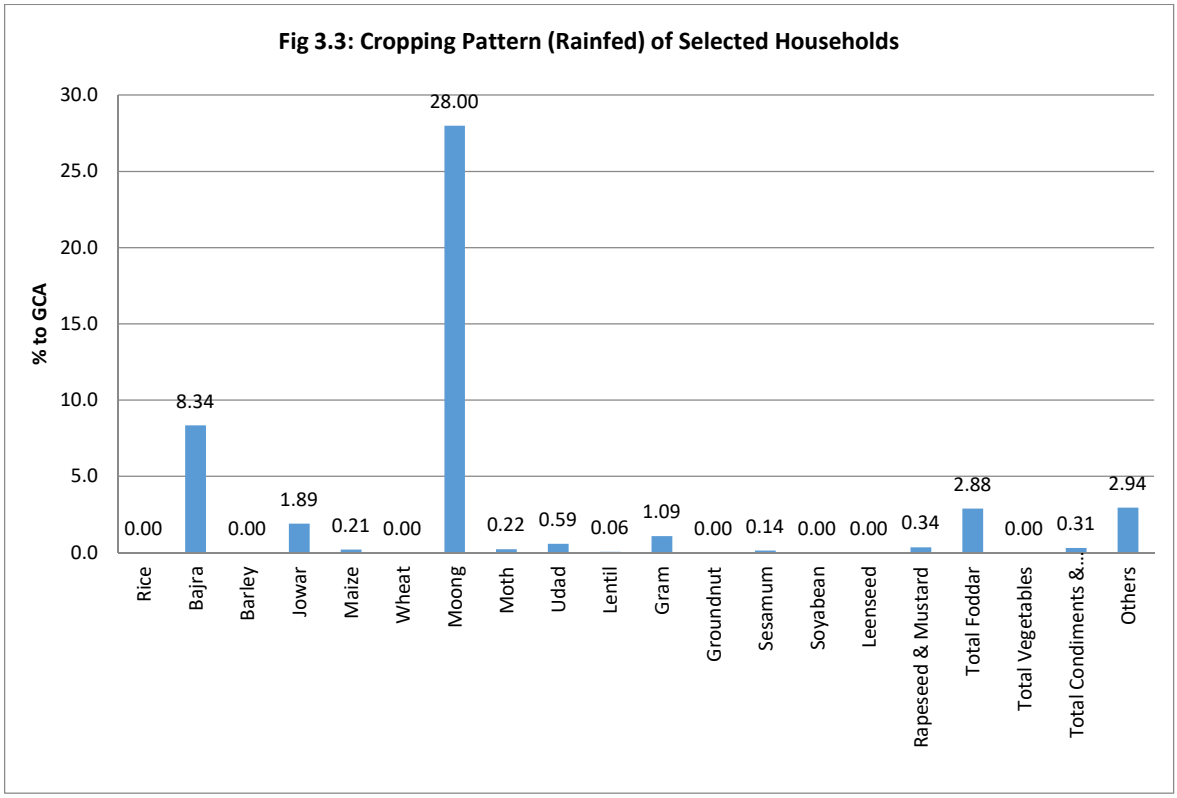
(% of GCA for the reference year 2018-19)

Crops	MF	SF	MDF	LF	Grand Total
Rice	1.17	0.68	0.27	0	0.34
Bajra	1.46	9.58	8.13	11.51	8.9
Barley	0.66	0.77	0	0	0.21
Jowar	0.59	1.53	2.6	2.04	1.99
Maize	13.68	8.6	4.86	1.26	5.19
Wheat	13.42	9.33	5.35	4.19	6.53
Coarse Cereals	**16.39**	**20.49**	**15.58**	**14.81**	**16.29**
Total Cereals	**30.98**	**30.49**	**21.2**	**18.99**	**23.16**
Moong	13.24	21.85	29.42	40.18	30.18
Moth	0	0	0.09	0.52	0.22
Udad	19.28	13.63	14.66	3.95	11.11
Lentil	9.18	5.45	2.87	0.35	3.11
Gram	9.36	5.11	8.73	2.08	5.74
Total Pulses	**51.06**	**46.04**	**55.76**	**47.09**	**50.35**
Total Foodgrains	**82.04**	**76.53**	**76.96**	**66.08**	**73.51**
Groundnut	0	0.09	0.04	0	0.03
Sesamum	0.15	0	0.36	0.3	0.25
Soyabean	3.37	3.75	2.64	0.69	2.22
Linseed	0	0	0.09	0	0.03
Rapeseed & Mustard	5.93	10.26	10.07	4.99	7.84
Total Oilseeds	**9.44**	**14.1**	**13.21**	**5.99**	**10.37**
Bajra (Fodder)	0	0	0.22	0	0.08
Fodder (Jowar)	4.39	2.77	4.88	7.25	5.29
Razka	0.51	0.13	0.09	0	0.11
Total Fodder	**4.9**	**2.9**	**5.19**	**7.25**	**5.48**
Brinjal (Vegetable)	0	0.09	0.02	0	0.02
Carrot	0	0.17	0	0	0.03
Cauliflower	0	0.09	0	0	0.02
Chilly	0	0.17	0	0	0.03
Ladyfinger	0.29	0.09	0	0	0.05
Lemon	0	0	0	0.27	0.1
Spniz (Vegetable)	0	0	0.02	0	0.01
Tommato	0.15	0	0	0	0.02
Onion	0.22	0	0	0	0.02
Pea	1.21	0.51	0.38	0	0.36
Potato	0.15	0	0	0	0.02
Total Vegetables	2.01	1.11	0.43	0.27	0.66
Cumin	0	0.85	2.19	6.3	3.19
Garlic	0.44	0	0	0	0.05
Isabgol	0	0	0	1.69	0.61
Sonf	0	0	0	1.69	0.61
Turmeric	0.15	0.26	0	0	0.06
Total Condiments & Spices	**0.59**	**1.11**	**2.19**	**9.68**	**4.52**
Cotton	0.29	0	0	5.34	1.95
Flower (Genda)	0.59	0	0	0	0.06
Guar	0	3.32	1.88	5.38	3.21
Sugarcane	0.15	0.94	0.13	0	0.23
Gross Cropped area (Irrigated + Unirrigated)	**100**	**100**	**100**	**100**	**100**
Gross Cropped area (Acre)	**270.34**	**464.34**	**883.39**	**910.98**	**2529.05**

It can be seen from table 3.4 that marginal farmers had more than 81 per cent of total land under irrigation followed by small, medium and large farm size category farmers with 53 per cent of total gross cropped area was under irrigation. At overall level, one fifth of cropped area was under irrigation covered by pulses crops, while across land size groups, same was highest in marginal group (35 percent) and the lowest was in large size farm group (9 per cent). Under rainfed condition, 30 per cent of total cropped area was under pulses of which moong was major pulse crop. At overall level, the major crops grown by the selected households were mung, urad, bajra, rapeseed mustard, wheat and gram. Pulse crops accounted for half of the cropped area of the selected households. Oilseed crops were mostly grown by the irrigated land holders.







3.5 Production, Cost and Returns by Farm Size (all crops)

The value of output, cost and net returns from all crops together by the farm size of selected households is presented in Table 3.7. It can be seen from the table that production per acre of all crops on average was reported to be the highest in case of marginal farmers and the lowest yield rate was realised by large farmer group. While among rainfed and irrigated condition crop production, marginal farmers have realised highest crop yield, however, large farmers group recorded highest yield under rainfed condition. The value of main output and cost of production per acre was estimated to be highest in case of marginal farmers and the lowest in case of medium group farmers. The net return realised by the selected farmer households was recorded to be highest for marginal land holders and lowest for large size land holders. Thus, it has been proved again that the marginal farmers reap the highest yield as well as returns, which may be due to small size of holdings and more involvement of family labours in crop cultivation. While gross farm income per household as expected was the highest in large land size group and lowest was in marginal size group.

Table 3.7: Value of Output, Cost and Net Returns (**aggregate of all crops**)

Farm Size	Production (quintals/acre)			Value of output (main+ by-product) (Rs./Acre)*	Cost of production (Rs./Acre)*		Net returns (Farm business income) (Rs./Acre) as per NOA	Farm income from cultivated area (Rs./hh)
	Irrigated	Rainfed	Av		Material cost	Labour cost		
Marginal	16.03	4.43	13.84	46830	6446	14745	25639	44668
Small	16.74	4.06	11.74	34586	5098	12064	17424	69617
Medium	11.73	4.42	8.52	28404	4251	9989	14164	103871
Large	8.82	4.15	5.92	24791	3865	9152	11774	206322
Total	12.74	4.24	8.74	29691	4441	10443	14806	90469

Notes: * VOP/COC/Net Returns per acre = VOP or COC or NR /NSA); GFI per acre=NR*NSA/HH;
Source: Field survey data

3.6 Summary of the Chapter

The chapter presented the household characteristics, cropping pattern and value of output of the selected households. The average size of the household was estimated to be 6 persons, while marginal land group households found to be smallest and the large group land holders had largest family size. As per the specification and selection of the scheme, three forth of the total respondents were female. The age range of three fourth of total selected household head/respondent was 30-60 years while around 9 per cent were from young group (less than 30 years) and rest were from above (10.7%) while across the groups, same trend was observed. In case of education status, majority of the respondents were found to be to be illiterate (56.67 %). Around one third of the total household respondents were educated mostly up to the SSC level. Around 60 percent of total family members are engaged in farming and average farming experience was estimated to be about 25 years. At overall level, about 49 per cent households were from other backward classes group followed by about 38 per cent from SC, about 10 percent from ST and rest were from open category. Among the selected marginal land holders group, about 69 per cent households together belonged to SC and ST category. Majority of households have agriculture as a main occupation while agriculture labour and allied was subsidiary occupation. The average income from agriculture and allied activities is recorded to be Rs. 118383/- while same was Rs. 35597/- from non-agricultural sources.

The average operational land holding of the selected household was about 6.11 acre having 40 percent land under irrigation. The marginal land holders had more land under irrigation than large land holders. Same the case of cropping intensity wherein largest cropping intensity was recorded by marginal farmers and lowest was in case of large farmer, with average cropping intensity of 138 per cent. The average rental value of land was observed to be Rs. 6000/- for irrigated land in Bundi district while Rs. 2500/- per acre in rainfed areas of Naguar district. While most of land leased in was on share cropping basis. On an average 40 per cent land has facility of irrigation. The topmost source of the irrigation was groundwater (dugwell and borewell) irrigating more than 90 per cent of total irrigated land at overall level. The average water charges rates prevailing in the study area was Rs. 3135/- per acre. At overall level, the major crops grown by the selected households were mung, urad, bajra, rapeseed mustard, wheat and gram. Pulse crops accounted for half of the cropped area of the selected households. The share of rainfed pulse area in gross cropped area was around 30 per cent while same was around 20 per cent irrigated land holders. Oilseed crops were mostly grown by the irrigated land holders. The marginal farmers had more than 81 per cent of total land under irrigation followed by small, medium and large farm size category farmers with 53 per cent of total gross cropped area under irrigation.

The value of output, cost and net returns by the farm size of selected households indicate that production per ha of crops was reported to be the highest in case marginal farmers and the lowest yield in large farmer group. While among rainfed and irrigated condition crop production, marginal farmers have realised highest crop yield, however, large farmers group recorded highest yield under rainfed condition. The value of main output and cost of production per hectare was estimated to be highest in case of marginal farmers and the lowest in case of medium group farmers. The net return realised by the selected farmer household was recorded to be highest for marginal land holders and lowest for large size land holders.

The next chapter presents efficiency of seed minikit realised by sample households.

Chapter IV

Efficiency of Seed Minikit in Rajasthan

4.1 Productivity comparison between Beneficiary and Non-Beneficiary

The details on the selected beneficiary and distribution of minikits are presented in Table 4.1. As noted in earlier chapter, total 200 beneficiary households were interviewed comprise of 60 of lentil growers, 40 urad growers, 88 mung growers and 12 gram growers. The selected beneficiary households accounts very meagre share in total beneficiaries of the State (Table 4.1). To estimate the effect of seed minikits, 100 control group samples were collected from all selected crops from same study area.

Table 4.1: Number of Seed Minikit distributed among Selected Farmers

Farmers	Selected households 2018	
	Numbers	%
Marginal	75	0.05
Small	62	0.04
Medium	48	0.03
Large	15	0.01
Total	200	0.14
Percentage of selected to total Beneficiaries in State	147566	100.00

The details on productivity and net returns from selected pulse crops with and without seed-minikits are presented in Table 4.2. It can be seen from the table that on an average, in all four selected pulse crops, cost of cultivation per acre of beneficiary households was estimated to be lower than the non-beneficiary households, must be because of lower cost of seed to some extent (due to partial share of seed minikit). While net returns per acre was reported higher in beneficiary group in cultivation of black gram and green gram only. Thus, kharif pulse crops cultivation found to be more profitable for beneficiary farmers than non-beneficiary farmers. Despite of the fact that quality seed was provided through seed minikits program, not much improvement in productivity level of these selected crops is reported by beneficiary farmers. While at overall level, almost 12 percent of total lentil beneficiary farmers had reported crop failure (with level of production less than 1 quintal/acre), of which largest share was of marginal lentil farmers whose income was severally affected (see, Annexure II). Also around 13

per cent of total urad beneficiary farmers and 40 per cent non beneficiary urad farmers reported crop failure wherein share of medium farmers from beneficiary group while marginal and small farmers from non-beneficiary group was the highest.

Table 4.2: Productivity[1] and net returns from pulses with and without Seed-minikits

Farm Size	Area under pulses (acre)		Value of Output [2] (Rs/ acre)		Cost of Cultivation (Rs/ acre)		Net Returns (Rs/ acre)		Net price obtained (Rs/quintal)	
	SMK	Without	SMK	Without	SMK	Without	SMK	Without	SMK	Without
Lentil										
Marginal	0.67	0.55	10061	29563	7737	13920	2325	15643	3995	3964
Small	0.74	0.74	23681	22081	11552	13291	12129	8790	4079	3966
Medium	0.68	0.96	21248	24659	11032	12977	10217	11682	4083	3923
Large	0.40	0.92	47532	30701	12262	12172	35270	18529	4000	4000
Total	0.69	0.83	17634	25261	9838	13067	7796	12194	4058	3947
Black gram										
Marginal	0.94	0.67	27707	12385	9724	6974	17983	5411	4619	4719
Small	2.06	1.75	31458	21820	11003	9757	20455	12062	4644	4675
Medium	3.76	4.75	4125	25483	5722	11063	-1597	14420	4200	4631
Large	5.93	-	8217	-	6220	-	1997	-	4500	-
Total	1.34	2.01	22980	22566	9023	10110	13957	12456	4613	4649
Green gram										
Marginal	1.75	1.98	19084	20100	8509	8495	10575	11605	6337	5346
Small	2.46	2.03	15214	19141	7726	8985	7488	10156	5876	5756
Medium	4.71	5.83	17201	14396	8322	8602	8878	5793	5928	5738
Large	7.84	11.38	17627	16468	8824	9237	8802	7231	6432	5797
Total	3.78	7.94	16990	15949	8326	9035	8664	6914	6081	5774
Bengal gram										
Marginal	1.19	0.79	25283	21491	11802	8470	13481	13021	5000	5000
Small	0.79	1.58	19995	12642	10262	9532	9733	3110	4720	5000
Medium	0.89	-	16294	0	9106	-	7187	-	4833	-
Large	2.97	2.37	8596	21491	5270	7754	3326	13737	5000	5000
Total	1.24	1.58	15837	18541	8373	8466	7464	10075	4863	5000
Average										
Marginal	1.01	0.80	20534	20885	9443	9465	11091	11420	4988	4757
Small	1.74	1.37	22587	18921	10136	10391	12451	8530	4830	4849
Medium	3.33	3.89	14717	16134	8546	10881	6171	5253	4761	4764
Large	6.57	9.83	20493	17165	8144	7291	12349	9874	4983	4932
Total	2.21	4.43	18360	20579	8890	10170	9470	10410	4904	4843

Notes: cf- crop failure.

[1] Farmer households reported low production/crop failure

Farm Size	Reported no main crop production- failure of crop (% to total sample households)							
	Lentil		Black gram		Bengal gram		Total	
	SMK	Without	SMK	Without	SMK	Without	SMK	Without
Marginal	3.85	0.00	3.13	22.22	0.00	0.00	2.67	11.76
Small	0.00	0.00	0.00	16.67	0.00	0.00	0.00	5.26
Medium	0.00	0.00	50.00	0.00	0.00	-	2.08	0.00
Large	0.00	0.00	0.00	-	50.00	0.00	6.67	0.00
Total	1.67	0.00	5.00	15.00	8.33	0.00	2.00	3.00

[2] As per CACP 2016-17 data also, share of by-product to main product was estimated to be 16.4 per cent in case of green gram crop and 7 per cent in case of gram crop.

Table further indicate that in case of rainfed pulse crops grown by the farmers in Naguar district (green gram (kharif season) and gram (rabi season)) were relatively more stable in crop productivity (except one case in gram of large land holder). As mentioned in Chapter I, the crop failure was the main problem in estimation of value of output and net returns. Around 18 per cent of beneficiary households and 8 per cent of non beneficiary households at overall level had realised production less than one quintal in acre of which some of them did not reap any harvest. The productivity level of kharif pulse crops grown by beneficiary farmers was marginally higher than that of non-beneficiary group, while opposite the case of rabi crops where higher productivity was reported by non-beneficiary group. Purchase of the green gram by the government at minimum support prices in Naguar district has helped the farmers to recover the cost of production and profit margin on crop cultivation.

The per quintal cost of production of kharif crops (mung and urad) was estimated lower in case of beneficiary farmers (Rs. 3382 and Rs. 2060/- per quintal) than non-beneficiary farmers while opposite picture was estimated in case of rabi crops (lentil and gram). The net price received (for main produce in market/village) by the farmers across the group of farmers was almost same in all crops, which ranges from Rs.3400-5000 per quintal in lentil, Rs. 2700-5000 per quintal in urad, Rs. 4000-6975 per quintal in case of mung and Rs. 4200 -5000 per quintal in case of gram. Thus, on an average, selected farmers have realised the net return of Rs. 9000-10000 per acre in cultivation of pulse crops (Annexure III). However, not much effect of seed minikit was reported as supplied quantity was much less than requirement and thus, farmers had to procured seed from the market or other sources.

4.2 Production Cost comparison between Beneficiary and Non-Beneficiary

The item-wise share in total cost of cultivation of all four selected pulse crops are presented in Tables 4.3 to 4.6. It can be seen from the tables that three operations together (harvesting and threshing, labor and land preparation) accounts for around 78 per cent of total cost of cultivation of Black gram and Green gram, while in case of lentil, corresponding figure was 70-72 percent. In

case of bengal gram, low harvesting cost by non beneficiary farmers put total to around 51 per cent as compared to 75 percent share reported by beneficiary farmers. Higher seed share in cost of cultivation was reported by non-beneficiary households than its counterpart. The lower cost of cultivation of black gram by r in beneficiary farmers has put share of seed cost higher than non beneficiary.

Table 4.3: Item-wise Cost details of Black Gram

Activity	SMK/ Without	**Cost details - Black Gram (%)**				
		Marginal	**Small**	**Medium**	**Large**	**Total**
Land Preparation	SMK	24.39	22.98	44.19	40.65	27.05
	Without SMK	22.47	24.64	22.4	-	22.97
Seed	SMK	**3.59**	**3.45**	**8.14**	**7.86**	**4.29**
	Without SMK	13.55	5.3	6.09	-	6.67
Inter crop	SMK	0	0	0	0	0
	Without SMK	0	0	0	-	0
FYM, Organic/Bio-fertiliser	SMK	0	0	0	0	0
	Without SMK	0.71	0	0	-	0.07
Major and minor nutrients	SMK	0	0	0	0	0
	Without SMK	0	0	0	-	0
Fertiliser	SMK	5.53	5.79	5.58	6.5	5.67
	Without SMK	4.16	6.01	5.48	-	5.48
Irrigation charges	SMK	0	0	0	0	0
	Without SMK	0	0	0	-	0
Plant protection chemicals	SMK	7.65	5.52	5.81	8.13	7.03
	Without SMK	6.42	7.72	6.57	-	6.84
Labour Charges*	SMK	25.47	25.14	15.35	15.18	23.71
	Without SMK	25.67	19.65	14.78	-	17.13
Harvesting and Threshing	SMK	31.22	30.05	18.6	18.97	28.9
	Without SMK	25.67	35.69	41.14	-	38.17
Bagging, transportation and marketing cost	SMK	2.16	6.19	2.33	2.71	3.15
	Without SMK	0.87	0.98	3.28	-	2.45
Others	SMK	0	0.88	0	0	0.21
	Without SMK	0.48	0	0.27	-	0.22
Total Cost (Rs per acre)	SMK	9724	11003	5722	6220	9023
	Without SMK	6974	9757	11063	-	10110

Note:* Includes all labour charges (such as weeding and plant protection measures, etc).

Table 4.4: Item-wise Cost details of Green Gram

Activity	SMK/Without	**Cost details -** Green Gram **(%)**				
		Marginal	**Small**	**Medium**	**Large**	**Total**
land Preparation	SMK	29.04	31.49	29.02	27.34	29.10
	Without SMK	29.76	26.42	28.99	26.33	27.12
Seed	SMK	3.55	4.95	5.96	6.77	5.77
	Without SMK	5.95	5.28	5.60	6.00	5.87
Inter crop	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
FYM, Organic/Bio-fertiliser	SMK	0.00	0.00	0.19	0.00	0.08
	Without SMK	0.00	0.00	0.00	0.62	0.43
Major and minor nutrients	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
fertiliser	SMK	4.96	6.34	5.89	5.77	5.88
	Without SMK	7.14	4.94	6.00	5.16	5.41
Irrigation charges	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.43	0.30
Plant protection chemicals	SMK	4.62	4.70	4.77	4.11	4.56
	Without SMK	7.44	6.31	5.14	6.16	5.89
Labour Charges*	SMK	22.34	24.83	21.58	21.13	22.23
	Without SMK	21.43	19.29	15.05	15.54	15.54
Harvesting and Threshing	SMK	32.89	25.23	29.51	28.04	28.44
	Without SMK	28.27	36.65	38.03	37.05	37.23
Bagging, transportation and marketing cost	SMK	2.37	2.22	2.61	5.26	3.23
	Without SMK	0.00	1.10	1.03	1.78	1.53
Others	SMK	0.22	0.25	0.47	1.58	0.70
	Without SMK	0.00	0.00	0.16	0.93	0.68
Total Cost (Rs per acre)	SMK	8509	7726	8322	8824	8326
	Without SMK	8495	8985	8602	9237	9035

Note:* Includes all labour charges (such as weeding and plant protection measures, etc).

Table 4.5: Item-wise Cost details of Lentil

Activity	SMK/Without	**Cost details -** Lentil **(%)**				
		Marginal	**Small**	**Medium**	**Large**	**Total**
land Preparation	SMK	23.72	21.52	22.06	20.62	22.37
	Without SMK	18.16	19.02	19.48	20.77	19.35
Seed	SMK	5.77	5.33	4.97	1.03	5.33
	Without SMK	8.04	8.24	8.57	10.09	8.59
Inter crop	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
FYM, Organic/Bio-fertiliser	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Major and minor nutrients	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Fertiliser	SMK	6.66	4.69	5.37	5.15	5.52
	Without SMK	4.51	4.76	4.7	5.19	4.74
Irrigation charges	SMK	4.48	8.75	5.83	8.25	6.58
	Without SMK	7.27	7.61	7.79	8.31	7.74
Plant protection chemicals	SMK	7.21	7.18	7.88	5.15	7.35
	Without SMK	5.32	4.95	4.67	7.42	5.1
Labour Charges*	SMK	23.87	21.76	23.11	32.99	22.94
	Without SMK	28.41	26.63	24.98	18.55	25.12
Harvesting and Threshing	SMK	27.04	29.22	29.36	26.8	28.51
	Without SMK	26.98	26.51	27.79	25.22	27.12
Bagging, transportation and marketing cost	SMK	1.18	1.54	1.43	0	1.38
	Without SMK	1.3	2.28	2.01	4.45	2.24
Others	SMK	0.07	0	0	0	0.02
	Without SMK	0	0	0	0	0
Total Cost (Rs per acre)	SMK	7737	11552	11032	12262	9838
	Without SMK	13920	13291	12977	12172	13067

Note:* Includes all labour charges (such as weeding and plant protection measures, etc).

Table 4.6: Item-wise Cost details of Bengal Gram

Activity	SMK/Without	**Cost details -** Bengal Gram **(%)**				
		Marginal	**Small**	**Medium**	**Large**	**Total**
land Preparation	SMK	35.70	37.78	45.90	54.37	42.55
	Without SMK	29.85	26.53	-	32.61	29.87
Seed	SMK	9.31	2.27	2.27	1.18	3.58
	Without SMK	23.88	31.83	-	32.61	30.86
Inter crop	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	-	0.00	0.00
FYM, Organic/Bio-fertiliser	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	-	0.00	0.00
Major and minor nutrients	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	-	0.00	0.00
fertiliser	SMK	5.36	2.46	4.32	3.84	3.70
	Without SMK	0.00	3.18	-	3.26	2.69
Irrigation charges	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	-	0.00	0.00
Plant protection chemicals	SMK	1.79	2.05	6.17	1.60	2.42
	Without SMK	0.00	3.32	-	2.72	2.49
Labour Charges*	SMK	35.35	21.76	24.06	23.03	25.45
	Without SMK	31.34	21.88	-	17.93	21.65
Harvesting and Threshing	SMK	10.71	16.43	9.25	15.99	14.09
	Without SMK	14.93	6.63	-	5.43	7.47
Bagging, transportation and marketing cost	SMK	0.00	8.62	1.23	0.00	3.54
	Without SMK	0.00	3.32	-	2.72	2.49
Others	SMK	1.79	8.62	6.79	0.00	4.67
	Without SMK	0.00	3.32	-	2.72	2.49
Total Cost (Rs per acre)	SMK	11802	10262	9106	5270	8373
	Without SMK	8470	9532	-	7754	8466

Note:* Includes all labour charges (such as weeding and plant protection measures, etc).

The labour use of pattern of the selected sample households indicate that the major labour using activities were weeding, sowing, application of plant protection, fertiliser and manures, and bagging, which accounted for the major share in labour use, which was relatively higher in case of non-beneficiary households than beneficiary households (Table 4.7). As labour operations like land preparation, harvesting and threshing were done by using machine labour and therefore human labour use was reported to be lower. While all the sowing was done by adopting line sowing method (Table 4.8).

Table 4.7: Use of human labour by activities (man days per ha.)

Activity	**SMK / Without**	**Use of human labour by activities (man days per acre)**				
		Black gram	**Green gram**	**Red gram**	**Bengal gram**	**Total**
Land Preparation*	SMK	0.00	0.00	0.00	0.03	0.01
	Without SMK	0.00	0.00	0.00	0.00	0.00
Sowing	SMK	0.73	0.36	0.7	0.81	0.45
	Without SMK	0.45	0.31	0.92	0.63	0.36
Manure & FYM	SMK	0.86	0.37	1.38	1.01	0.55
	Without SMK	0.67	0.3	1.2	0.42	0.39
Major and minor nutrients	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Irrigation	SMK	0.17	0	1.72	0	0.18
	Without SMK	0	0	2.29	0	0.13
Inter cultural operations	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Plant protection	SMK	1.23	0.98	2.17	0.34	1.10
	Without SMK	1.07	0.5	2.17	0.42	0.64
Weeding and plant protection measures	SMK	4.72	3.32	2.03	3.17	3.37
	Without SMK	4.05	2.61	3.85	3.37	2.82
Harvesting and Threshing*	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
Bagging (HL) & **Transporting***	SMK	1.52	1.38	2.13	1.75	1.48
	Without SMK	1.12	1.07	2.37	1.26	1.15
Total	**SMK**	9.23	6.49	10.14	7.08	7.18
	Without SMK	7.38	4.85	12.80	6.11	5.54

Notes: * activities are completed by hiring machine[3] .

[3] Though it is not comparable, machine labour converted into human labour at prevailing wage rate to know total human labour use.

Activity	SMK / Without	Black gram	Green gram	Red gram	Bengal gram	Total
	SMK	23.44	17.67	23.37	16.68	19.95
	Without SMK	29.22	20.65	24.80	11.24	22.57
Total	SMK	32.67	24.16	33.51	23.76	27.13
	Without SMK	36.60	25.50	37.60	17.35	28.11

Table 4.8: Method of Sowing followed by Selected Households in reference year (%)

Method	Marginal	Small	Medium	Large	Total
Broadcasting	-	-	-	-	-
Drill sown	-	-	-	-	-
Line Sown	100	100	100	100	100

4.3 Distribution of Seed Minikits

The minikits were distributed only through agriculture department by following the stipulated procedure of selection and distribution of minikits (Table 4.9). Adhaar card was the main and only document produced by the sample beneficiary for availing the benefit and used by the issuing authority to validate the claim as beneficiary (Table 4.10).

Table 4.9: Distribution of Seed Minikit (Numbers)

Agency	**Marginal**	**Small**	**Medium**	**Large**	**Total**
KVK	-	-	-	-	-
Agricultural Departments	75	62	48	15	200
Gram Panchayat	-	-	-	-	-
Others	-	-	-	-	-

Table 4.10: Documents Submitted to Avail Seed Minikit (Numbers)

Documents	Marginal	Small	Medium	Large	Total
Aadhar Card	75	62	48	15	200
Pahani (Land records)	-	-	-	-	-
Bank Passbook	-	-	-	-	-
Others	-	-	-	-	-

Among the beneficiaries, the highest share was of women beneficiary in total followed by the beneficiary from small and marginal famers and then from SC/ST category (Table 4.11).

Table 4.11: Criteria for Farmer Selection

Farmers	**Number**	**%**
Any Interested Farmers	0	0.00
SC/ST	105	23.76
Small/Marginal	137	31.00
BPL	0	0.00
Women	200	45.25
Lottery among applications	0	0.00
Others	0	0.00
Total	442	100.00

Note: Multiple responses.

The subsidies rate of the seed minikit was Rs. 184 per kit of Bengal gram (16 kg), Rs. 45 per kit of Green gram (4 kg); Rs. 50 per kit of lentil (8 kg) and Rs. 50 per kit of Black gram (4 kg). No amount was reimbursed as amount charged was token amount from farmers which must be 10 per cent of total cost of seed (Table 4.12).

Table 4.12: Financial details of Seed Minikit

Farm Size	Amount Charged (Rs/kit)				Amount Reimbursed (Rs/Kit)	Reimbursed Through (Rs/Kit)		Duration of Reimbursement (months)
	Bengal Gram (16 kg)	Green Gram (4 kg)	Lentil (8 kg)	Black Gram (4 kg)		Cash	Bank	
Marginal	184	45	50	50	0	0	0	-
Small	184	45	50	50	0	0	0	-
Medium	184	45	50	50	0	0	0	-
Large	184	45	50	50	0	0	0	-
Total	184	45	50	50	0	0	0	-

4.4 Awareness about the Scheme

All the selected households had received the information about the seed minikit programme from the agriculture officer of the taluk/district and none of the other source of information was reported (Table 4.13).

Table 4.13: Awareness of distribution of Seed Minikit (%)

Source	Marginal	Small	Medium	Large	Total
Agriculture Officer (RSK)	100	100	100	100	100
Farmer Facilitator	-	-	-	-	-
Fellow Farmer	-	-	-	-	-
Print & Visual media	-	-	-	-	-
Wall writing	-	-	-	-	-
KVK official	-	-	-	-	-
Agricultural University	-	-	-	-	-

4.5 Efficiency in Distribution and Usage of Seed Minikits

The details on seed minikit provided for pulses crop during 2018-19 area presented in Tale 4.14. The size of minikits was 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong and urad. This quantity is sufficient to plant 0.2 ha. While area covered under particular pulse and oilseed crop was reported to be more than same which indicate farmers have used the home grown retained or seed purchased from market or from villagers. Thus, seed provided under

programme was inadequate and therefore need to scale up the quantity of seed. Green gram and black gram were grown during kharif season while Bengal gram and lentil were grown during rabi season. Some farmers have retained the seeds for next sowing season.

Table 4.14: Details of Seed Minikit provided for Pulses Crop 2018-19

Sr. No.	Farm Size	Season	Marginal	Small	Medium	Large	Total
A	**Green Gram**						
	Variety: IPM-02/03 & MH-421						
	Quantity (kgs/hh)		4	4	4	4	4
	Area Sown (acre/hh)		1.75	2.46	4.71	7.84	3.78
	Season	Kharif	1.75	2.46	4.71	7.84	3.78
		Rabi	-	-	-	-	-
		Summer	-	-	-	-	-
	Output Produced from seed minikits (Qt/hh)		4.63	5.42	12.45	19.06	9.39
	Output used as seed (kgs per hh)*(Output retained)		0.03	0.19	0.68	0.55	0.38
B	**Black Gram**						
	Variety: PU-31 & Pratap 1						
	Quantity (kgs/hh)		4	4	4	4	4
	Area Sown (acre/hh)		0.94	2.06	3.76	5.93	1.34
	Season	Kharif	0.94	2.06	3.76	5.93	1.34
		Rabi	-	-	-	-	-
		Summer	-	-	-	-	-
	Output Produced from seed minikits (Qt/hh)		5.02	12.36	2.50	7.50	5.88
	Output used as seed (kgs per hh)		0.41	1	0	0.5	0.47
C	**Bengal Gram**						
	Variety- CSJ-515						
	Quantity (kgs/hh)		16	16	16	16	16
	Area Sown (acre/hh)		0.16	0.15	0.06	0.54	0.17
	Season	Kharif	-	-	-	-	-
		Rabi	0.16	0.15	0.06	0.54	0.17
		Summer	-	-	-	-	-
	Output Produced from seed minikits (Qt/hh)		6.00	3.33	4.25	5.00	4.21
	Output used as seed (kgs per hh)		0.25	0.25	0.25	0.50	0.29
D	**Lentil**						
	Variety: PL-8						
	Quantity (kgs/hh)		8	8	8	8	8
	Area Sown (acre/hh)		0.67	0.74	0.68	0.40	0.69
	Season	Kharif	-	-	-	-	-
		Rabi	0.67	0.74	0.68	0.40	0.69
		Summer	-	-	-	-	-
	Output Produced from seed minikits (Qt/hh)		1.40	3.84	3.19	4.20	2.64
	Output used as seed (kgs per hh)		0.18	0.50	0.37	1.00	0.33

The selected farmers households did not receive the any other seed minikit of any other crop (Table 4.15).

Table 4.15: Details of Seed Minikit provided for Cereals or Oilseeds Crop 2018-19

Farm Size	Season	Marginal	Small	Medium	Large	Total
Crop 1 – Name						
Variety	-	-	-	-	-	-
Quantity (kgs/hh)	-	-	-	-	-	-
Area Sown (ha.)	-	-	-	-	-	-
Season	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
Output Produced from seed minikits (Qt/hh)	-	-	-	-	-	-
Output used as seed (kgs per hh)*(Output retained)	-	-	-	-	-	-

Note: No other crops minikits distribute in Naguar and Bundi district of Rajasthan.

With seed minikit, no other input such as fertiliser or any culture was provided (Table 4.16).

Table 4.16 : Content of the Seed Minikit (%)

Farm Size	POP	PSP culture (100gms)	Rhizobium (100gms)	Others	None
Marginal	-	-	-	-	-
Small	-	-	-	-	-
Medium	-	-	-	-	-
Large	-	-	-	-	-
Total	-	-	-	-	-

Note: Not distributed with seed minikits.
Source: Field survey data.

As mentioned earlier, minikits were provided to selected beneficiary farmers with token amount of 10 per cent of total cost of seed which was provided by the RSK available in the village (Table 4.17). As mentioned earlier, selected farmers had put more area under selected crops, thus besides seed minkits, selected farmers had purchased seed from market or other sources (Table 4.18).

Table 4.17: Seed purchased by the farmer for the reference year through seed minikits

Crop	Quantity (kgs)	Price* (Rs/ kit)	Source of purchase (%)				Distance from farm (kms)	Transportation Cost (Rs/Kit)
			KVK	GOR	Private Dealer	Co-op society		
Lentil	8	500	-	100	-	-	0	-
Black Gram	4	500	-	100	-	-	0	-
Green Gram	4	450	-	100	-	-	0	-
Bengal Gram	16	1840	-	100	-	-	0	-
Others	-	-	-	-	-	-	-	-

Notes: As per the Scheme guidelines, 10 per cent of total cost of minikit was charged as token money from the farmers; GOR- Department of Agriculture, Govt of Rajasthan

Table 4.18: Seed Purchased by the farmer from other sources in the reference year

Crop	Quantity (kgs)	Price (Rs/ kg)	Source of purchase (%)					Distance from farm (kms)	Transportation Cost (Rs/Kit)
			KVK	RSK	Private Dealer	Co-op society	Own Retained seed		
Lentil	8	500	-	-	25.42	-	74.58	0.00	-
Black Gram	4	500	-	-	27.08		72.92	0.00	-
Green Gram	23.59	108	-	-	60.15	3.76	36.09	0.08	0.08
Bengal Gram	33.33	132	-	-	50.00	-	50.00	1.00	1.67
Others	-	-	-	-	-	-		-	-

The two main channels for marketing of pulses utilised by the selected famers were sale to merchant or prearranged contract and sell at APMC market (Table 4.19).

Table 4.19: Marketing Channels through which Pulses sold by the Selected Households

Farm Size	Marketing channels through which pulses sold by the selected households (**percentage of output**)								
	Wholesale market (APMC)	Local market	Village directly	Co-operative	Government agencies	Intermediaries at farm gate	Merchant or pre-arranged Contract	Not sale	Aggregate
Green Gram (Moong)___									
Marginal	41.18	0.00	0.00	0.00	0.00	0.00	58.82	0.00	100
Small	27.78	0.00	0.00	0.00	0.00	0.00	69.44	2.78	100
Medium	48.98	0.00	0.00	0.00	0.00	0.00	51.02	0.00	100
Large	69.70	0.00	0.00	0.00	0.00	0.00	30.30	0.00	100
Total	47.41	0.00	0.00	0.00	0.00	0.00	51.85	0.74	100
Black Gram (Urad)____									
Marginal	21.95	0.00	0.00	0.00	0.00	0.00	68.29	9.76	100
Small	36.36	0.00	0.00	0.00	0.00	0.00	54.55	9.09	100
Medium	71.43	0.00	0.00	0.00	0.00	0.00	14.29	14.29	100
Large	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100
Total	31.67	0.00	0.00	0.00	0.00	0.00	58.33	10.00	100
Bengal Gram (Gram)									
Marginal	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100
Small	28.57	0.00	0.00	0.00	0.00	0.00	71.43	0.00	100
Medium	50.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	100
Large	33.33	0.00	0.00	0.00	0.00	0.00	33.33	33.33	100
Total	26.67	0.00	0.00	0.00	0.00	0.00	66.67	6.67	100
Lentil___									
Marginal	16.13	0.00	0.00	0.00	0.00	0.00	74.19	9.68	100
Small	25.93	0.00	0.00	0.00	0.00	0.00	74.07	0.00	100
Medium	25.00	0.00	0.00	0.00	0.00	0.00	71.43	3.57	100
Large	50.00	0.00	0.00	0.00	0.00	0.00	50.00	0.00	100
Total	23.33	0.00	0.00	0.00	0.00	0.00	72.22	4.44	100

4.6 Farmers perceptions about Seed Minikits

During the survey, selected farmers were asked to give their opinion regarding distribution of seed minikit which are tabulated and presented in Tables 4.20 to 4.23. All sample household opined that seed distribution programme is advantageous and noted the yield and quality difference in same (Table 4.20). However, all of them were also opined that seed distributed was insufficient and at least seed should cover 0.32 ha (0.79 acre) area compared to 0.2 ha (0.49 acre) under present scheme (Table 4.21).

Table 4.20: Farmers Opinion regarding distribution of Seed Minikit for reference year (%)

Opinion		Marginal	Small	Medium	Large	Total
1.Is seed minikit distribution advantageous	Yes	100	100	100	100	100
	No	0	0	0	0	0
a. Yield Difference		100	100	100	100	100
b. Quality difference		100	100	100	100	100
c. More profitable		0	0	0	0	0
d. Short duration of crop		0	0	0	0	0
e. Other		0	0	0	0	0

Table 4.21: Farmers Opinion regarding Quantity of Seed Supplied in Seed Minikit

Sufficient in Quantity (%)	Marginal	Small	Medium	Large	Total
1. Yes	0	0	0	0	0
2. No	100	100	100	100	100
Opinion –how much quantity in kgs should be distributed					
Green Gram	8	8	8	8	8
Bengal Gram	20	20	20	20	20
Urad	8	8	8	8	8
Lentil	16	16	16	16	16

Note: farmers required minimum seed of minikits for 2 Bigha or 0.32 ha or 0.79 acre area.

Also, most of the selected households were satisfied with the quality of seed provided to them (Table 4.22) and timely distribution of same (Table 4.23).

Table 4.22: Farmers Opinion regarding Quality of Seed supplied in Seed Minikit

Quality better than seed available in market (%)	Marginal	Small	Medium	Large	Total
1. Yes	96.00	79.03	89.58	86.67	88.50
2. No	4.00	20.97	10.42	13.33	11.50
Opinion –Provide reasons					
Average quality	20.00	43.55	47.92	66.67	37.50
Good quality	76.00	35.48	41.67	20.00	51.00
Best quality	2.67	9.68	4.17	0.00	5.00
Poor quality	0.00	3.23	0.00	0.00	1.00
Not suitable quality	1.33	8.06	6.25	13.33	5.50

Table 4.23: Farmers Opinion regarding timeliness of distribution of Seed Minikit (%)

Timely distribution of Kit (%)	Marginal	Small	Medium	Large	Total
1. Yes	89.3	96.8	100.0	100.0	95.0
2. No	10.7	3.2	0.0	0.0	5.0
Opinion – Provide reasons					
	-	-	-	-	-
	-	-	-	-	-

Note: No data regarding opinion of timeliness of distribution of seed minikits.

The major problems faced by farmers in availing the seed minikit are presented in Table 4.24. It can be seen from the table that less supply of seed minikit was the major problem faced by the selected farmers. In order to overcome these problems, sample households have given suggestions, such as more supply of seed, suitable variety suitable to local condition and seed should be given to all farmers (Table 4.25). While survey, it was reported that no demonstration/ training was given to selected beneficiary households on how to use the minikit as well as on package of practises.

Table 4.24: Major Problems faced by Farmers in Availing the Seed Minikit (%)

Sl No.	Problems	Marginal	Small	Medium	Large	Total
1	Less supply	100	100	100	100	100
2	Poor /Average quality	0.0	6.5	2.1	0.0	2.5
3	Not suitable variety	0.0	1.6	0.0	0.0	0.5
4	Untimely availability	9.3	0.0	0.0	0.0	3.5

Note: Multiple responses.

Table 4.25: Measures to Improve the Effectiveness of the Scheme (%)

Sl No.	Problems	Marginal	Small	Medium	Large	Total
1	More supply	100.0	100.0	100.0	100.0	100.0
2	Demand according supply	0.0	6.5	2.1	0.0	2.5
3	Suitable variety	60.0	54.8	62.5	73.3	60.0
4	timely availability	9.3	0.0	0.0	0.0	3.5
5	Government purchasing	4.0	12.9	4.2	13.3	7.5
6	Draught resistant variety	53.3	46.8	54.2	40.0	50.5
7	Pest resistant variety	53.3	46.8	54.2	40.0	50.5
8	All farmers covered	18.7	27.4	75.0	146.7	44.5

4.7 Summary of the Chapter

It was observed that on an average, cost of cultivation per acre of beneficiary households was estimated to be lower than the non-beneficiary households, must be because of lower cost of seed to some extent (due to partial share of seed minikit). While net returns per acre was reported higher in beneficiary group in cultivation of black gram and green gram only. Thus, kharif pulse crops cultivation found to be more profitable for beneficiary farmers than non-beneficiary farmers. Almost 12 percent of total lentil beneficiary farmers had reported crop failure (with level of production less than 1 quintal/acre), of which largest share was of marginal lentil farmers whose income was severally affected. Also around 13 per cent of total urad beneficiary farmers and 40 per cent non beneficiary urad farmers reported crop failure wherein share of medium farmers from beneficiary group while marginal and small farmers from non-beneficiary group was the highest. In case of rainfed crops, pulse crops grown by the farmers in Naguar district (green gram (kharif season) and gram (rabi season)) were relatively more stable in crop productivity (except one case in gram of large land holder). The productivity level of kharif pulse crops grown by beneficiary farmers was marginally higher than that of non-beneficiary group, while opposite the case of rabi crops where higher productivity was reported by non-beneficiary group. Purchase of the green gram by the government at minimum support prices in Naguar district has helped the farmers to recover the cost of production and profit margin on crop cultivation. The net price received (for main produce in market/village) by the farmers across the group of farmers was almost same in all crops, which ranges from Rs.3400-5000 per quintal in lentil, Rs. 2700-5000 per quintal in urad, Rs. 4000-6975 per quintal in case of mung and Rs. 4200 -5000 per quintal in case of gram. Thus, on an average, selected farmers have realised the net return of Rs. 9000-10000 per acre in cultivation of pulse crops. However, not much effect of seed minikit was reported as supplied quantity was much less than requirement and thus, farmers had to procured seed from the market or other sources.

The item-wise share in total cost of cultivation of all four selected pulse crops indicate that three operations together (harvesting and threshing, labor and

land preparation) accounts for around 78 per cent of total cost of cultivation of Black gram and Green gram, while in case of lentil, corresponding figure was 70-72 percent. In case of bengal gram, low harvesting cost by non beneficiary farmers put total to around 51 per cent as compared to 75 percent share reported by beneficiary farmers. Higher seed share in cost of cultivation was reported by non-beneficiary households than its counterpart. The labour use of pattern of the selected sample households indicate that the major labour using activities were weeding, sowing, application of plant protection, fertiliser and manures, and bagging, which accounted for the major share in labour use, which was relatively higher in case of non-beneficiary households than beneficiary households. As labour operations like land preparation, harvesting and threshing were done by using machine labour and therefore human labour use was reported to be lower. While all the sowing was done by adopting line sowing method (Table 4.8).

The minikits were distributed only through agriculture department by following the stipulated procedure of selection and distribution of minikits. Adhaar card was the main and only document produced by the sample beneficiary for availing the benefit and used by the issuing authority to validate the claim as beneficiary. Among the beneficiaries, the highest share was of women beneficiary in total followed by the beneficiary from small and marginal famers and then from SC/ST category. The subsidies rate of the seed minikit was Rs. 184 per kit of Bengal gram (16 kg), Rs. 45 per kit of Green gram (4 kg); Rs. 50 per kit of lentil (8 kg) and Rs. 50 per kit of Black gram (4 kg). No amount was reimbursed as amount charged was token amount from farmers which must be 10 per cent of total cost of seed.All the selected households had received the information about the seed minikit programme from the agriculture officer of the taluk/district and none of the other source of information was reported. The size of minikits was 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong and urad. This quantity is sufficient to plant 0.2 ha. While area covered under particular pulse and oilseed crop was reported to be more than same which indicate farmers have used the home grown retained or seed purchased from market or from villagers. Thus, seed provided under programme was inadequate and therefore need to scale up the quantity of seed. Green gram and black gram were grown during kharif season while Bengal gram

and lentil were grown during rabi season. Some farmers have retained the seeds for next sowing season. The selected farmers households did not receive the any other seed minikit of any other crop. The seed minikits were provided to selected beneficiary farmers with token amount of 10 per cent of total cost of seed which was provided by the RSK available in the village. The selected farmers had sown more area under selected crops, thus besides seed minkits, selected farmers had purchased seed from market or other sources.

All sample household opined that seed distribution programme is advantageous and noted the yield and quality difference in same. However, all of them were also opined that seed distributed was insufficient and at least seed should cover 0.32 ha (0.79 acre) area compared to 0.2 ha (0.49 acre) under present scheme. Also, most of the selected households were satisfied with the quality of seed provided to them and timely distribution of same. The major problems faced by farmers in availing the seed minikit were less supply of seed minikit was the major problem faced by the selected farmers. In order to overcome these problems, sample households have given suggestions, such as more supply of seed, suitable variety suitable to local condition and seed should be given to all farmers. While survey, it was reported that no demonstration/ training was given to selected beneficiary households on how to use the minikit as well as on package of practises.

The next chapter presents conclusion and policy suggestions.

Chapter V

Major Findings and Policy Suggestions

5.1 Main Findings from Secondary data

- Rajasthan State accounts for about 6.9 per cent of total food grains production of country during 2017-18 from 14.24 mha area having 11.16 per cent share in national coverage under foodgrains. It is important to note the low coverage of food grains under irrigation in Rajasthan (35.9 per cent) as compared to 53.1 per cent of area coverage under irrigation at national level (2014-15). In case of pulses production, state of Rajasthan holds second position after Madhya Pradesh and accounts for 13.4 per cent in total national pulses stock having 17.8 per cent of national area under pulses (5.33 mha), while lower area under coverage (21 per cent) resulted in low level of productivity of pulses of 635 kg/ha as compared to 841 kg/ha at national level.
- The share of the cultivable area to total geographical area was about 75 per cent which is almost same during the two period points, i.e. TE 2006-7 and TE 2016-17. While share of the area under pulses to total cultivable area has increased from 13.4 per cent to almost 17 per cent during the corresponding two period points. Thus over the period of one decade, area under pulses has increased by 3.6 per cent points. Bundi, Pali, Ajmer and Tonk district has registered the significant increase in share of area under pulses to cultivable area during two points period.
- Nagaur district is the largest producer of pulses (12.41%) followed Bikaner (11.61%), Churu (7.49%), Ajmer (6.55%), Pali and Jaipur (6 % each), while Bundi contributes about 3 per cent share in state pulses production during 2016-17.
- The three top most districts having more than 11 per cent share each in total area at the State are Churu (14.3%), Nagaur (12.4%) and Bikaner (11.3%). The data on district-wise share in area under pulses at district gross cropped area indicate that five topmost pulses growing districts were Churu having about 56

per cent of gross cropped area under pulses, followed by Nagaur (43 per cent), Ajmer (40%), Pali (40%) and Bikaner (35%).

- During kharif seasons, two pulse crop minikits viz. Green gram and Black Gram were distributed to the farmers under this scheme. The highest number of minikits of both kharif pulse crops together for both years were distributed in Nagaur district (22.3% of total minikits) followed by Ajmer (8.42%), Jodhapur (8.23%), Jaipur (8.18%), Pali (7.71%), Tonk (6.38%), and Jalore (6.18%). These seven districts accounts for two third of seed minikits distributed of moog and urad together.
- While in case of rabi pulses (Bengal Gram and Lentil), the highest number of minikits of both rabi pulse crops together for both years were distributed in Bundi district (13.35% of total minikits) followed by Bhilwara 7.95%), Bharatpur (7.21%), Bikaner (7.10%), Tonk (6.78%), Sikar (6.68%), and Pratagarh (6.09%). These seven districts accounts for 55 per cent of total seed minikits distributed.

5.2 Main Findings from Field Survey data

- The average size of the household was estimated to be 6 persons, while marginal land group households found to be the smallest (5.63) and the large group land holders had the largest family size (6.68).
- As per the specification and selection of beneficiary of the scheme (women criteria), three forth of the total respondents were women. The age range of more than 80 per cent of total selected household respondent was 30-60 years while around 9 per cent were from young group (less than 30 years) and rest were from above 60 age group (11%), while across the groups, near about same trend was observed.
- In case of education status, majority of the respondents were found to be to be illiterate (56.67%). Around one third of the total household respondents were educated mostly up to the SSC level. This indicate the lower education status of the respondents in Rajasthan in general, women in particular. Around 60 percent of total family members were engaged in farming and average farming experience was estimated to be about 25 years.

- At overall level, about 49 per cent households were from other backward classes group followed by about 38 per cent from SC, about 10 percent from ST and rest were from open category. Among the selected marginal land holders group, about 69 per cent households together belonged to SC and ST category.
- Majority of households have agriculture as a main occupation while agriculture labour and allied was subsidiary occupation. The average income from agriculture and allied activities is recorded to be Rs. 118383/- while same was Rs. 35597/- from non-agricultural sources.
- The average operational land holding of the selected household was about 6.11 acre having 40 percent land under irrigation (net) at overall level. Across land size groups, 71 percent of land of marginal farmers was under irrigation, followed by 45 per cent land of small, 41 per cent land of medium and 29 per cent of land of large farm group has irrigation facility. Thus, more the land, less the area under irrigated and vice versa. Same the case of cropping intensity wherein highest cropping intensity was recorded by marginal farmers and the lowest was in case of large farmer, with average cropping intensity of 138 per cent.
- The average rental value of land was observed to be Rs. 6000/- for irrigated land in Bundi district while Rs. 2500/- per acre in rainfed areas of Naguar district. While most of land leased in land was on share cropping basis.
- The topmost source of the irrigation was groundwater (dug-well and bore-well) irrigating more than 80 per cent of total irrigated land at overall level. The average water charges rates prevailing in the study area was Rs. 3125/- per acre water.
- The marginal farmers had more than 81 per cent of total land under irrigation followed by small, medium and large farm size category farmers with 53 per cent of total gross cropped area was under irrigation. At overall level, one fifth of cropped area was under irrigation covered by pulses crops, while across land size groups, same was highest in marginal group (35 percent) and the lowest was in large size farm group (9 per cent). Under rainfed condition, 30 per cent of total cropped area was under pulses of which moong was major pulse crop.

- At overall level, the major crops grown by the selected households were mung, urad,bajra, rapeseed mustard, wheat and gram. Pulse crops accounted for half of the cropped area of the selected households. The share of rainfed pulse area in gross cropped area was around 30 per cent while same was around 20 per cent irrigated land holders. Oilseed crops were mostly grown by the irrigated land holders.
- The value of output, cost and net returns by the farm size of selected households indicate that production per acre of all crops on average was reported to be the highest in case of marginal farmers and the lowest yield rate was realised by large farmer group. While among rainfed and irrigated condition crop production, marginal farmers have realised highest crop yield, however, large farmers group recorded highest yield under rainfed condition. The value of main output and cost of production per acre was estimated to be highest in case of marginal farmers and the lowest in case of medium group farmers. The net return realised by the selected farmer households was recorded to be highest for marginal land holders and lowest for large size land holders. Thus, it has been proved again that the marginal farmers reap the highest yield as well as returns, which may be due to small size of holdings and more involvement of family labours in crop cultivation. While gross farm income per household as expected was the highest in large land size group and lowest was in marginal size group.
- It was observed that on an average, in all four selected pulse crops, cost of cultivation per acre of beneficiary households was estimated to be lower than the non-beneficiary households, must be because of lower cost of seed to some extent (due to partial share of seed minikit). While net returns per acre was reported higher in beneficiary group in cultivation of black gram and green gram only. Thus, kharif pulse crops cultivation found to be more profitable for beneficiary farmers than non-beneficiary farmers. Despite of the fact that quality seed was provided through seed minikits program, not much improvement in productivity level of these selected crops is reported by beneficiary farmers. While at overall level, almost 12 percent of total lentil beneficiary farmers had reported crop failure (with level of production less than

1 quintal/acre), of which largest share was of marginal lentil farmers whose income was severally affected. Also around 13 per cent of total urad beneficiary farmers and 40 per cent non beneficiary urad farmers reported crop failure wherein share of medium farmers from beneficiary group while marginal and small farmers from non-beneficiary group was the highest.

- Rainfed pulse crops grown by the farmers in Naguar district (green gram (kharif season) and gram (rabi season)) were relatively more stable in crop productivity (except one case in gram of large land holder). As mentioned in Chapter I, the crop failure was the main problem in estimation of value of output and net returns. Around 18 per cent of beneficiary households and 8 per cent of non beneficiary households at overall level had realised production less than one quintal in acre of which some of them did not reap any harvest. The productivity level of kharif pulse crops grown by beneficiary farmers was marginally higher than that of non-beneficiary group, while opposite the case of rabi crops where higher productivity was reported by non-beneficiary group. Purchase of the green gram by the government at minimum support prices in Naguar district has helped the farmers to recover the cost of production and profit margin on crop cultivation.
- The per quintal cost of production of kharif crops (mung and urad) was estimated lower in case of beneficiary farmers (Rs. 3382 and Rs. 2060/- per quintal) than non-beneficiary farmers while opposite picture was estimated in case of rabi crops (lentil and gram). The net price received (for main produce in market/village) by the farmers across the group of farmers was almost same in all crops, which ranges from Rs.3400-5000 per quintal in lentil, Rs. 2700-5000 per quintal in urad, Rs. 4000-6975 per quintal in case of mung and Rs. 4200 - 5000 per quintal in case of gram. Thus, on an average, selected farmers have realised the net return of Rs. 9000-10000 per acre in cultivation of pulse crops. However, not much effect of seed minikit was reported as supplied quantity was much less than requirement and thus, farmers had to procured seed from the market or other sources.
- The three operations together (harvesting and threshing, labor and land preparation) accounts for around 78 per cent of total cost of cultivation of

Black gram and Green gram, while in case of lentil, corresponding figure was 70-72 percent. In case of bengal gram, low harvesting cost by non beneficiary farmers put total to around 51 per cent as compared to 75 percent share reported by beneficiary farmers. Higher seed share in cost of cultivation was reported by non-beneficiary households than its counterpart.

- The labour use of pattern of the selected sample households indicate that the major labour using activities were weeding, sowing, application of plant protection, fertiliser and manures, and bagging, which accounted for the major share in labour use, which was relatively higher in case of non-beneficiary households than beneficiary households.
- As labour operations like land preparation, harvesting and threshing were done by using machine labour and therefore human labour use was reported to be lower. While all the sowing was done by adopting line sowing method.
- The minikits were distributed only through agriculture department by following the stipulated procedure of selection and distribution of minikits.
- Adhaar card was the main and only document was produced by the sample beneficiary for availing the benefit and used by the issuing authority to validate the claim as beneficiary.
- The highest share was of women beneficiary in total followed by the beneficiary from small and marginal famers and then from SC/ST category.
- The subsidies rate of the seed minikit was Rs. 184 per kit of Bengal gram (16 kg), Rs. 45 per kit of Green gram (4 kg) ; Rs. 50 per each kit of lentil (8 kg) and Black gram (4 kg). No amount was reimbursed as amount charged was token amount from farmers which must be 10 per cent of total cost of seed.
- All the selected households had received the information about the seed minikit programme from the agriculture officer of the taluk/district and none of the other source of information was reported.
- The size of minikits was 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong and urad. This quantity is sufficient to plant 0.2 ha. While area covered under particular pulse and oilseed crop was reported to be more than same which indicate farmers have used the home grown retained or seed purchased

from market or from villagers have used. Thus, seed provided in inadequate in nature and need to scale up the quantity of seed.

- Some farmers have retained the seeds for next sowing season.
- The selected farmers households did not receive the any other seed minikit of any other crop.
- With seed minikit, no other input such as fertiliser or any culture was provided.
- The two main channels for marketing of pulses utilised by the selected famers were sale to merchant or prearranged contract and sell at APMC market.
- All sample household opined that seed distribution programme is advantageous and noted the yield and quality difference in same.
- However, all of them were also opined that seed distributed was insufficient and at least seed should cover 0.32 ha (0.79 acre) area compared to 0.2 ha (0.49 acre) under present scheme
- Also, most of the selected households were satisfied with the quality of seed provided to them and timely distribution of same.
- The major problem faced by farmers in availing the seed minikit was less quantity of seed minikit.
- In order to overcome these problems, sample households have given suggestions, such as more supply of seed, suitable variety suitable to local condition and seed should be given to all farmers.
- While survey, it was reported that no demonstration/ training was given to selected beneficiary households on how to use the minikit as well as on package of practises

5.3 Conclusion and Policy Suggestions

The seed distribution programme has found to be advantageous in terms of availability of cheap seed. However, seed distributed was insufficient quantity as well not much difference in productivity was reported. The policy implications emerged out of the study is as follows:

- The government should ensure timely availability of adequate of quality seed by taking into account the actual requirement of seed in particular area.

- Bottom-up approach should be used in implementation of the scheme.
- Seed minikits should be provided only to farmers those have attended the training on same. Demonstration should be given before distributing the Seed minikit
- State Agriculture Universities should try to develop the seed varieties suitable to local conditions.
- The awareness level about the scheme and need of Seed Replacement Rate needs to increased/raised through agricultural extensions programmes.
- Procurement of output by Government Agencies would certainly help in increasing area under pulses.

References

Acharya, Shabd S. (2007), "National Food Polices Impacting on Food Security: The Experience of a Large Populated Country-India", in Basudeo Guha-Khasnosis, Shabd S. Acharya and Benjamin Davis (Eds) *Food Insecurity, Vulnerability and Human Rights Failure,* Studies in Development Economics and Policy, World Institute for Development Economics Research.

APEDA, Agricultural and Processed Food Products Export Development Authority, Ministry of Commerce and Industry, Government of India. https://apeda.gov.in/apedawebsite/

Bhalla, G.S. (2007), *Indian Agriculture since Independence*, National Book Trust of India, New Delhi.

Braun, Jochim Von (2007), *The World Food Situation: New Driving Forces and Required Action,* International Food Policy Research Institute (IFPRI), Washington, D.C.

Chand, Ramesh (2008), "The Global Food Crisis: Causes, Severity and Outlook, *Economic and Political Weekly,* Vol. 43, No.26-27, June 28, 2008, pp.115-123.

Chand, Ramesh and Jaya Jumrani (2013), "Food Security and Undernourishment in India: Assessment of Alternative Norms and the Income Effect", *Indian Journal of Agricultural Economics,* Vol. 68, No.1, January March, 39-53.

Dutta, R. A. and Kalpana M. Kapadia (2011), Possibilities and Constrains in Increasing Pulses Production in Rajasthan and the Impact of National Food Security Mission on Pulses, AERC Report No. 140, Agro-Economic Research Centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat.

Dutta, R.A.; S. S. Kalamkar and M. R. Ojha (2015a). "Impact of National Food Security Mission (NFSM) on Input use, Production, Productivity and Income in Gujarat" *Agricultural Situation in India*, Vol. LXXII, No. 4, July 2015, pp. 33-47.

Dutta, R.A.; S.S. Kalamkar and M. R. Ojha (2015), Impact of National Food Security Mission (NFSM) on Input use, Production, Productivity and Income in Gujarat, AERC Report No. 155, Agro-Economic Research Centre, Sardar Patel University, Vallabh Vidyanagar, Anand, Gujarat.

FAO, IFAD and WFP (2019), *The State of Food Insecurity in the World 2018,* Rome, FAO.

GHI (2019a), Global Hunger Index 2019- the Challenge of Hunger and Climate Change, October (www.globalhungerindex.org).

GOI (2011), Census 2011, Provisional Population Totals, Office of the Registrar General and Census Commissioner, Government of India, New Delhi.

GOI (2013), *State of Indian Agriculture-2012-13*, Ministry of Agriculture, Department of Agriculture and Cooperation, New Delhi.

GOI (2014), National Food Security Mission: http://nfsm.gov.in/

GOI (2016), Pulses in India: Retrospect and Prospects, Pub.No.: DPD/Pub.1/Vol. 2/2016, Directorate of Pulses Development, Department Of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare Government Of India Vindhyachal Bhavan Bhopal, M.P.

GOI (2018), Pulses Revolution from Food to Nutritional Security, Crops Division, Ministry of Agriculture & Farmers Welfare, Department of Agriculture, Cooperation & Farmers Welfare, Krishi Bhavan, Government of India, New Delhi.

GOI (2019). Agricultural Statistics at a Glance 2018. Directorate of Economics & Statistics. Ministry of Agriculture and Farmers Welfare. Government of India.

GOR (2018, various years). Agricultural Statistics at a Glance 2017-18. Commissionerate of Agriculture, Government of Rajasthan, Jaipur.

IFPRI (2011), Global Food Policy Report 2011, *International Food Policy Research Institute*, Washington DC, USA.

Kalamkar S. S., N.V. Shende and V. G. Atkare (2002).“Coarse Cereals and Pulses Production in India: Trends and Decomposition Analysis”, *Agricultural Situation in India*, Vol. 59, No. 9, December 2002, pp. 581-587.

Kalamkar, S.S. (2003). “Economics of Pulses Production and Identification of Constraints in Raising their Production in Maharashtra”, *Agricultural Situation in India*, Vol. 60, No. 2, May 2003, pp. 81-91.

Kalamkar, S.S. (2003a). “Trends in Pulse Production in Maharashtra”, *Productivity*, Vol. 44, No. 3, October-December 2003, pp. 499-510.

Kalamkar, S.S. (2011), “Food Security in South Asia with Special reference to India*”, Millennium Asia,* Vol. 2, No. 1, January-June 2011, pp. 93-121.

Kalamkar, S.S. (2011a), “Agricultural Marketing and Food Security in India”, *Indian Journal of Agricultural Marketing,* Vol. 25, No. 3, September December 2011, pp. 128-149.

Kumar, Parmod (2019), Relevance and Distribution Efficiency of Seed Minikits in Pulses, Research Proposal (submitted to Ministry of Agriculture, GOI), ADRTC, Institute for Social and Economic Change Nagarabhavi P.O. Bangalore-560072, Karnataka, India.

Kumar, Parmod (2013), Demand and Supply of Agricultural Commodities in India, Macmillan Publishers India Ltd, New Delhi.

National Food Security Mission, Accelerated Pulses Production Programme Operational Guidelines *http://agricoop.nic.in/sites/default/files/A3Pguidelines_0.pdf*

National Food Security Mission, Ministry of Agriculture and Farmers Welfare, India *https://www.nfsm.gov.in/*

Sandhu, J.S., Sanjay Lohiya and D.P. Malik (2014), “Impact of Technical Components of National Food Security Mission II: Lessons Leant and Next Steps”, Directorate of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi.

Shende N.V. and S. S. Kalamkar (2012). Technology Adoption Gap in Pulses Cultivation in Maharashtra", *Journal of Agricultural Development and Policy,* Vol. 22, No. 1, January June 2012, pp. 39-47.

Shende, N.V.; S. S. Kalamkar & B.D. Bhole (2002)."Export and Imports Trend of India's Pulses", *New Agriculturist*, Vol.13, No.1-2, April October 2002, pp. 141-146.

Singh, Anil Kumar; S S Singh; Ved Prakash; Santosh Kumar and S K Dwivedi (2015). Pulses Production in India: Present Status, Bottleneck and Way Forward. Journal of AgriSearch 2(2): 75-83

Singh, Anil Kumar; SS Singh, Ved Prakash, Santosh Kumar and SK Dwivedi (2015). Pulses Production in India: Present Status, Bottleneck and Way Forward. *Journal of Agri Search.* 2(2): 75-83.

Swain, M., S. S. Kalamkar and Kalpana Kapadia (2012), '*State of Rajasthan Agriculture 2011-12*', AERC Report No. 147, Agro-Economic Research Centre, S. P. University Vallabh Vidyanagar.

Websites visited:

https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_IND.pdf, accessed on March 25, 2020.

https://pib.gov.in/newsite/PrintRelease.aspx?relid=199401

http://dpd.dacnet.nic.in/npdp/isopom8.htm

Annexures

Annexure I- Distribution of Net Irrigated Area as per Source (%)

Row Labels	MF	SF	MDF	LF	Grand Total
0	0.00	0.00	0.00	0.00	0.00
1	**27.71**	**31.92**	**33.84**	**19.04**	**28.29**
2	**52.38**	**52.53**	**41.04**	**67.50**	**52.66**
3	7.62	0.00	0.00	0.00	1.20
1,2	2.94	8.55	11.49	13.46	10.11
1,2,3	0.00	1.62	2.30	0.00	1.15
1,3	3.46	2.42	0.77	0.00	1.31
1,5	0.00	2.96	3.83	0.00	1.96
2,3	5.89	0.00	0.00	0.00	0.93
2,5	0.00	0.00	6.74	0.00	2.40
Grand Total	100.00	100.00	100.00	100.00	100.00

Annexure II: Details on Number of Crop failures (%)

Farm Size	Main Production (=0)		Main Production (0.1 to 1 Qtl.)		Main output produced (0 to 1 Qtl)		Total Sample Farmers	
	SMK	Without	SMK	Without	SMK	Without	SMK	Without
Lentil								
Marginal	3.8	0.0	69.2	0.0	73.1	0.0	100.0	100.0
Small	0.0	0.0	15.8	12.5	15.8	12.5	100.0	100.0
Medium	0.0	0.0	21.4	0.0	21.4	0.0	100.0	100.0
Large	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Total	1.7	0.0	40.0	3.3	41.7	3.3	100.0	100.0
Black gram								
Marginal	3.1	22.2	15.6	33.3	18.8	55.6	100.0	100.0
Small	0.0	16.7	20.0	0.0	20.0	16.7	100.0	100.0
Medium	50.0	0.0	0.0	0.0	50.0	0.0	100.0	100.0
Large	0.0	-	0.0	-	0.0	-	100.0	-
Total	5.0	15.0	15.0	15.0	20.0	30.0	100.0	100.0
Green gram								
Marginal	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Small	0.0	0.0	0.0	25.0	0.0	25.0	100.0	100.0
Medium	0.0	0.0	3.3	0.0	3.3	0.0	100.0	100.0
Large	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Total	0.0	0.0	1.1	2.1	1.1	2.1	100.0	100.0
Bengal gram								
Marginal	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Small	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0
Medium	0.0	-	0.0	-	0.0	-	100.0	-
Large	50.0	0.0	0.0	0.0	50.0	0.0	100.0	100.0
Total	8.3	0.0	0.0	0.0	8.3	0.0	100.0	100.0
Total								
Marginal	2.7	11.8	30.7	17.6	33.3	29.4	100.0	100.0
Small	0.0	5.3	6.5	10.5	6.5	15.8	100.0	100.0
Medium	2.1	0.0	8.3	0.0	10.4	0.0	100.0	100.0
Large	6.7	0.0	0.0	0.0	6.7	0.0	100.0	100.0
Total	2.0	3.0	15.5	5.0	17.5	8.0	100.0	100.0

Annexure III- Net Price Obtained (All output Rs./quintal)

Farm Size	Net price obtained (Main+ by product)/quantity (Rs/quintal)	
	SMK	Without
Lentil		
Marginal	4564	4547
Small	4555	4517
Medium	4512	4335
Large	4909	4474
Total	4550	4417
Black gram		
Marginal	5165	5533
Small	5235	5198
Medium	6200	5103
Large	6500	0
Total	5248	5160
Green gram		
Marginal	7222	6115
Small	6906	6632
Medium	6638	6601
Large	7248	6462
Total	6900	6498
Bengal gram		
Marginal	5000	5667
Small	4745	5000
Medium	4833	-
Large	5100	5100
Total	4894	5176
Average		
Marginal	5488	5466
Small	5360	5337
Medium	5546	5346
Large	5831	4009
Total	5396	5313

Appendix I

Comments on the Draft Report received from
Agricultural Development and Rural Transformation Centre,
Institute for Social and Economic Change, Bangalore, Karnataka

Comments on draft report

"Relevance and Distribution Efficiency of Seed Minikits of Pulses in Rajasthan"

Submitted by

Agro-Economic Research Centre, Vallabh Vidhyanagar – Gujarat

1.	Title of report	A Relevance and Distribution Efficiency of Seed Minikits of Pulses in Rajasthan
2.	Date of receipt of the revised draft report	August 19, 2020
3.	Date of dispatch of the comments	August 29, 2020
4.	Comments on the Objectives of the study	The objectives of the study as proposed have been 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.	The authors have adhered to the chapter outline and table formats.

7. Overall view on acceptability of report:

The report is revised as per comments given on first draft of this report and all suggestions and corrections are incorporated, thus this report can be accepted.

*****

Appendix II

Action taken by the authors based on the comments received

- The report was revised as per comments received on first draft and was resubmitted. All suggestions and corrections are incorporated at appropriate places.

S. S. Kalamkar