

Seed Minikits of Pulses Program Relevance and Distribution Efficiency in Karnataka

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Final Report

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EXECUTIVE SUMMARY

India is global leader in terms of production and consumption of pulses. However, India is also leading importer of pulses because there is widening gap between demand and supply/availability of pulses within the country. Therefore, to raise the domestic production of pulses the Central and state governments have initiated various programme oriented at raising production of pulses though enhancement in area as well as productivity. Seed Minikits is one such programme. 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. The size of minikits is 16 kg of gram, 8 kg seed of lentil and 4 kg each for moong, urd and pigeon pea. This quantity would be sufficient to plant 0.2 ha. In addition, under this package, Karnataka state government 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. The state government is required to educate/provide training to the farmers to multiply seed mini-kits seeds for further use. 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 initiated to examine the need, application, pertinence and efficiency in distribution of seed minikits. The report analyses the relevance and distribution efficiency of seed minikits programme in pulses.

Main Objectives

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.

Database and Methodology

The methodology followed in the study is the following:

Two districts, Mysore as irrigated and Tumkur as dryland based on the available list of households with highest seed minikits distributed in the district during the reference period of 2017-18 and 2018-19. A total number of 231 beneficiaries and 111 non beneficiaries were selected making the total number of selected farmers up to 342. Information was compiled on area sown, productivity and resources used for seed minikits pulse crops as well as the reproduced seed pulse crops. The reference period of survey data was 2018-19, i.e., Kharif (July-Nov 2018), Rabi (Nov 2018 to March 2019) and Summer (March-June 2019).

Main Findings

Major findings based on secondary data

In Karnataka, the pulses constituted around 11.6 per cent area in India and around 8 per cent share of production in 2018-19. Pulses production in Karnataka increased from around 8 lakh tonnes in TE 1990-91 to 18.6 lakh tonnes in 2018-19. In Karnataka, the share of pulses to gross cropped area was around 20 per cent during the early 1990s which increased to near 25 per cent in 2018-19. Among the three selected pulse crops, there was perceptible increase in area and production only in red gram (tur) as compared to black gram (urad) and green gram (moong). Area under black gram was almost stagnant at around 1 lakh hectares while green gram area slightly increased from 2.4 lakh hectares in TE 1990-91 to around 3.5 hectares in TE 2016-17. On the other hand area under red gram, i.e., tur crop increased from around 5 lakh hectares in the early 1990s to 8.7 lakh hectares in TE 2016-17. Similarly, production of black gram and green gram remained stagnant at around 50 thousand and less than 1 lakh tones, respectively in the entire period from 1990-91 to 2016-17. Production of tur, on the other hand increased from 1.7 lakh tones in TE 1990-91 to more than 5 lakh tones in TE 2016-17, an increase of almost three times. Jointly, these three pulse crops contributed around 1/3rd share in area and production of total pulses in the state in the early 1990s whereas their share in area and production increased to slightly less than half by TE 2016-17. The increase in share in both area and production was mainly contributed by red gram whereas share of other two pulses in production declined during the reference period.

Out of around 1.5 lakh seed minikits distributed for pulses in Karnataka, around 57 per cent alone were distributed for the red gram which is one of the most important pulse crops grown in Karnataka. Red gram was followed by black gram and green gram with a share of around 19.6 and 18.6 per cent, respectively. The remaining pulses shared only rest of the around 5 per cent share of seed minikits distributed in the state. Thus, given the fact that

mainly three pulse crop minikits viz., red gram, black gram and green gram were distributed to the farmers under this scheme, we selected these three crops for this study for carrying out the primary survey.

Major findings based on primary survey

Among the selected sample, beneficiary households constituted 67.5 per cent of the sample while control group constituted that of 32.5 per cent. Across various sizes of holdings, marginal and small farmers constituted 34 and 45 per cent of the sample, respectively while medium and large farmers constituted 19 and 3 per cent, respectively. The average family size of the household was 2.63 members per household. Sample farmers had around 29 years of farming experience and around 2.3 members of the family were engaged in farming activities. Among the selected households, around 20 per cent of the respondents were illiterate while around 55 per cent were matriculate or below. Only around 6 per cent were graduates and 5 per cent were post-graduates. The lower level of education also reveals poor economic condition of the sample households. The sample had representation of General category (57 per cent), OBC (20 per cent), Scheduled castes (15 per cent) and Scheduled Tribes (8 per cent). Although the seed minikits scheme was targeted towards SC and ST farmers, the majority of sample belonged to the general category households. This indicates that either there was misappropriation of the programme by general category households or the allocation of seed minikits by authorities was not implemented as per the basic objective of the scheme.

On average, the net operated area per household of the selected sample was 4.14 acres. The number of large and medium farmer in the sample was around 20 per cent only. The cropping intensity was measured only 1.3. Almost 60 percent of the net operated area among the sample households was under rainfed conditions. The rest of 40 percent was irrigated mainly by bore wells and canal. Among the selected farmers, pulses occupied around 40 per cent of the total cropped area with proportion of around 10 per cent each by red gram, green gram and black gram and additional 10 per cent area occupied by other pulses like cowpeas, horse gram and field beans. Cereals including paddy and ragi accounted for 33 per cent area and perennials 14 per cent. On average, the net earnings per household was Rs 77 thousand per annum and its range was noted as Rs 32 thousand for marginal farmers, Rs 69 thousand for small farmers, Rs 1.36 lakh for medium farmers and Rs 3.6 lakh for the large farmers.

Per acre output was much evenly distributed across small and large farmers. Its value was highest Rs 37 thousand per acre in the case of large farmers, Rs 34 thousand for medium

and small farmers and Rs 33 thousand for the marginal farmers. The cost of production per acre although did not show any particular trend but it was highest for large farmers and lowest for the medium farmers. The net returns from agriculture (FBI) showed an inverse trend with large farmers having not only highest returns per household but also per acre. At the aggregate farm business income per acre averaged at Rs 18.5 thousand that varied from Rs 16.8 thousand in the case of marginal farmers, Rs 18 thousand for small farmers, Rs 19 thousand for medium farmers and Rs 20 thousand for large farmers.

At the aggregate, area under selected three pulse crops averaged at around slightly less than one acre per household among the beneficiary farmers and slightly above one acre among the control group farmers who were selected from the vicinity of the beneficiary farmers so that there is no bias in the comparison of the two categories. The value of crop productivity per acre was much higher for the beneficiary farmers as compared to control group. At the aggregate value of output per acre for the beneficiary farmers was Rs 16.5 thousand compared to 12.7 thousand for the control group farmers. The cost of production was also slightly higher for the beneficiary farmers compared to control group with the exception of small farmers. The overall returns from pulse crops were much higher for beneficiary farmers compared to control group. The beneficiary farmers' per acre earning from pulses was Rs 10 thousand as compared to less than Rs 7 thousand for control farmers. Thus, from this comparison, one can conclude that the overall economy of seed minikits (SMK) appears to be advantageous to the farmers and need to be promoted on larger scale.

We found that although the overall cost of production of SMK was not less than the control group but with the advantage of better productivity, the overall returns were much better for SMK farmers compared to control group farmers. The main components of production costs were land preparation, seed, farmyard manure/organic fertilizer and labour charges. Labour component alone constituted almost 45-50 per cent cost of production. The second most important component was organic manure/bio fertilizer and land preparation which each constituted around 15-20 per cent share. Fertilizer and irrigation which generally constitute very higher share in total cost of production was found insignificant in pulses.

Regarding distribution efficiency of seed minikits, against the criteria of distribution of seed minikits among, scheduled caste, scheduled tribe, women and small and marginal farmers, scheduled caste and scheduled tribe farmers consisted only 11 per cent in the selected sample. Small and marginal farmers consisted only less than 20 per cent. The selection of farmers seems to be based on first come first serve as almost 70 per cent farmers indicated the criterion was any interested farmers. The women farmers obtaining SMK was

almost negligible as only one farmer got SMK based on women criterion in the two selected districts. Thus, comparing the distribution of SMK with the scheme guidelines, the distribution was completely violation of the eligibility criterion.

On the aggregate, beneficiary households received 4.1 kgs of red gram seed, 4.4 kg of green gram and 4.3 kg of black gram seed through the minikits. There were only slight variations in the quantity of seeds in the minikits across various farm size holdings. Using the seed provided through minikits, on average households sown 0.98 acres per household of red gram, 0.93 acres of green gram and 0.81 acres of black gram area. Out of the total quantity produced by the beneficiary households, a part of the output was used by them for replicating area under pulses in the next season. Thus, the basic objective of the scheme of replicating seeds through beneficiary farmers seem to be working well in all the three crops in the study area.

According to the guidelines, the kit should contain Package of Practice (POP), 100 gms of PSP culture and 100 gms of Rhizobium along with 4 kgs of seed. Almost 95 per cent of the beneficiaries received POP and rhizobium whereas 100 percent of the beneficiaries received PSP culture in the kit. Whereas the beneficiary farmers obtained seed in the SMK free of cost, the non beneficiary farmers had to pay around Rs 80 to Rs 92 per kg for the seed in the market. Both beneficiary and non beneficiary travelled 8 to 10 kilometers to access the seed and the transportation cost was worked out Rs 20 per kit for the beneficiaries (for 4 kg of seed) and Rs 18 per kg for the non beneficiary households.

The selected farmers obtained awareness about the scheme mostly through the Raitha Samparka Kendra (RSK), farmer facilitator and other fellow farmers. Around 97 per cent respondents pointed out that the seed minikits and the material received in it was really useful for growing pulse crops. Majority of the beneficiary farmers (90 per cent) pointed out that the yield increased when they used the seeds distributed through minikits and 55 percent were of the opinion that there is quality difference in the seeds over what they were using previously. Another 10 percent beneficiaries pointed out that using the seed from the minikits increased profitability of their crop either through better yield or through better price. Around 60 percent of the respondents pointed out that the seed supplied through minikits was adequate while other 40 percent pointed out that the quantity was inadequate as 4 kgs of seed which was supplied through seed minikits was sufficient only to sow half an acre of pulse crops. They also opined to increase the supply of seed distributed through these kits. Further, the respondents expressed their opinion for increasing the quantity with 22 percent of them requiring 5 to 10 kgs of seeds to be distributed through the kit instead of 4 kgs.

Largely the respondents (84 per cent) were satisfied with the quality of the seed distributed as they opined that the quality was better than the seed available in the market. The respondents expressed that seeds distributed possessed good germination, good grain size with good grain quality and the seeds were drought and disease resistant. However, 16 percent of the respondents were dissatisfied with the quality of the seeds. Regarding timeliness of the seed minikits distribution, almost 90 per cent of the beneficiary respondents were of the opinion that the kits were distributed on time while only 10 per cent pointed out that the kits were not received on time. Around 90 percent of our respondent farmers indicated that they didn't encounter any kind of issues or not have concern relating to distribution of seed minikits. Rest of the 10 per cent of farmers indicated documentations and procedural issues in obtaining seed minikits and that the seed supplied was of poor quality and they faced shortage in sowing the seed for the desired land kept for the subjective crop. Thus, from the above analysis one can conclude that although a few farmers faced some problems in availing the benefits of the scheme but by and large distribution of seed minikits was smooth, timely and advantageous to the beneficiaries.

Policy Suggestions

Major suggestions for improving the effectiveness and reach of the scheme

Among the measures required to improvise the scheme, a few are indicated here:

- Sample farmers suggested to increase the quantity of seeds supplied and make the distribution of seed minikits timely as these two measures will make the scheme much more effective.
- Beneficiaries indicated to include other crops under the ambit of this scheme. Although, rice and other nutri cereals are covered under this scheme in Karnataka, however, the selected beneficiaries obtained the benefit only for one pulse crop. Therefore farmers desired to cover more numbers of crops for each beneficiary under the ambit of this scheme.
- Create awareness about the scheme will broaden its scope and help in making the scheme more inclusive. Although, the scheme was mainly targeted to SC/ST, women and other poor and small and marginal farmers. However, due to lack of knowledge among those classes, the targeted groups were not very well represented in the scheme.

- Providing technical guidance along with kits and methods of demonstration and how to use the rhizobium and PSB which are provided in the minikit will benefit farmers and guide them to use the kits more appropriately.
- Supply the improved varieties of seeds like short duration, drought and pest resistant and provide ICT and market information about the crops (seeds) supplied in the kit.
- Provision of wider publicity of the scheme by reaching out to more and more farmers especially the weaker sections of the farming community will make more inclusive. In this regards, ICT should be made use and mobile phone message, voice and video call could prove very informative to the farmers. Using local newspapers and local radio and television stations for spreading information would be much useful.
- Imparting training and information through extension services could broaden the reach of the scheme. Similarly, personal meetings and demonstration also could raise the reach out to farmers.
- Increase the number of beneficiaries and the quantity of seed provided as was demanded by the majority of the beneficiaries.

Chapter - I

Introduction

1.1 Background

Agriculture still remains backbone of Indian economy as it provides food for more than 1.2 billion people and employment to about 54.6 per cent (Census, 2011) of the population. India is the world's second largest producer of rice, wheat and other cereals and leading producer of pulses. The huge demand for cereals in the global market is creating an excellent environment for the export of Indian cereal products (APEDA). India is by and large vegetarian in dietary habit and heavily depends upon vegetative sources to meet out its daily protein requirements. India is global leader in terms of production and consumption of pulses. India is leading importer of pulses because production of pulses/legume crops has been stagnant over the years (Singh *et.al* 2015) although situation has slightly changed in the recent past. Consequent upon this, there is widening gap between the demand and supply/availability of pulses. About 20 per cent of the total pulses demand is met by imports alone.

Pulses are leguminous plants and belong to the Fabaceae family. Pulses are also an excellent feed and fodder for livestock. Endowed with the unique ability of biological nitrogen fixation, carbon sequestration, soil amelioration, low water requirement (250 to 300 mm) and capacity to withstand harsh climate, pulses have remained an integral component of sustainable crop production system, especially in the dry areas. Pulses are the primary sources of protein (22 per cent) for the poor and the vegetarians (40 per cent).

According to Crops Division, Ministry of Agriculture & Farmers Welfare Government of India Report in 2019, during 2018-19, pulses were cultivated over > 29 million ha (Mha) of area and recorded the highest ever production of 25.42 million tonnes (Mt) at a productivity level of 853 kg/ha. Twelve states were the major producers contributing > 90 per cent pulses. These were Madhya Pradesh (> 8 Mt), Rajasthan (>3 Mt), Maharashtra (>3 Mt) Uttar Pradesh (>2 Mt), Karnataka (2 Mt) and Andhra Pradesh (>1 Mt) followed by Gujarat, Jharkhand, Tamil Nadu, and Chhattisgarh producing <1.0 Mt each. Karnataka yields 645 kg/hectare of total pulses with an area of 3.02 Million hectares and 1.95 Million tonnes of production (Agriculture Statistics at a Glance 2019). Gram, Urad, Arhar (Tur), Moong and Lentil are the major pulses produced and consumed in India. Gram (chickpea) is the most dominant pulse with an average share of around 45 per cent in total pulse production during 2018-19.

Pulses are essential adjuncts to a predominantly cereal-based diet and enhance the biological value of protein consumed. The nutritional content of various pulses is depicted in Table 1.1.

Table 1.1: Nutritional value of various pulses (mg/100 gm)

Name of the food stuff	Gram	Urad	Moong	Kulthi	Lentil	Pea	Tur	Moth	Khesari	Cow Pea
Protein (%)	20	24	25	22	25	22	22	25	31	23
Vit. A (IU)	316	64	83	119	450	31	220	16	200	60
Vit. C	3	---	---	---	---	---	---	2	---	---
Vit. K	0.29	0.19	---	---	0.25	---	---	---	---	---
Thiamine	0.30	0.41	0.72	0.42	0.45	0.47	0.45	0.45	0.39	0.50
Ribo-flavin	0.51	0.37	0.15	0.20	0.49	0.21	0.51	0.09	0.41	0.48
Nieotinic acid	2.1	2.0	2.4	1.50	1.50	3.50	2.60	1.5	2.20	1.30
Biotin (g/100 gm)	10	7.5	---	---	13.20	---	7.60	---	7.50	202
Choline	194	206	---	---	299	---	183	---	---	---
Folic acid (g/100g)	125	144	---	---	107	---	83	---	100	---
Inositol	240	90	---	---	130	---	100	---	140	---
Pantothenic acid	1.3	3.5	---	---	1.60	---	1.50	---	2.60	---
Total No. of Vit./mineral	12	11	5	6	11	5	10	6	9	6

Source: Pulses in India: Retrospect and prospects, (DPD/Pub 1/Vol. 2/2016).

Pulses are important crops after cereals that provide high quality protein complementing cereal proteins. Potential of pulses to help address future global security, nutrition and environmental sustainability has also been acknowledged by the UN declaring the year 2016 as ‘International Year of Pulses.’ This led to several important interventions in pulses’ area and production across the world. As of now, India is the leading producer of pulses in the world and accounts for about 33 per cent of the world production and about 39 per cent of the area under cultivation (GoI, 2017). Though India is the largest pulses’ producer in the world, it imports large quantity of pulses from the rest of the world. In recent years, the quantity of pulses imports came closer to 50 or 50 plus lakh tones, whereas exports hovered around 2 to 4 lakh tons. India’s imports and exports of major pulses during 2017-18 to 2018-19 may be seen from the Table 1.2.

Table 1.2: India’s import and export of major pulses (Unit Lakh tons)

Pulses	Import				Export			
	2017-18	% Share in total pulses import	2018-19	% of Share in total pulses import	2017-18	% Share in total pulses import	2018-19	% of Share in total pulses import
Peas (Matar)	28.77	47.98	8.51	33.68	0.04	2.47	0.02	0.72
Chickpea (Chana)	9.81	16.34	1.85	7.35	1.27	70.92	2.28	80.02
Moong/Urad	3.46	8.69	5.74	22.71	0.16	69.33	0.18	6.56
Lentil (Masur)	7.96	12.55	3.48	9.84	0.11	6.24	0.13	4.88
Pigeon pea (Tur)	1.12	10.64	5.30	21.00	0.10	5.87	0.09	3.26
Total Imports/Exports	56.07	---	25.27	---	1.79	---	2.85	---

Source: Department of Commerce, Government of India, Commodity profile for pulses, Sept., 2019.

The area under pulses in India in 1950-51 was 19.09 million hectares, which increased to 29.99 million hectares in 2017-18 (i.e., an increase of about 57 per cent). Total production of pulses was 8.41 million tons in 1950-51, which increased to 25.23 million tons in 2017-18 showing an increase of about 200 per cent. The yield rates also increased from 441 kg/ha in 1950-51 to 841 kg/ha in 2017-18 (an increase of around 91 per cent). During 2020-21, the total domestic supply of pulses was 23.73 million tons of pulses, which was short of annual domestic demand estimated around 26.05 million tons (Kumar NITI Aayog, 2018). However, during the current year, the Government is targeting pulses output of 26.30 MT. The country still faced huge shortage, but now the situation has little bit improved (ET 2020). The NITI Aayog forecasted for the projected population of around 1.57 billion in 2032-33, total requirement of pulses would be around 35.2 million tones whereas the domestic supply forecasted was 33.9 million tones with a shortage of around 2 million tonnes (Kumar NITI Aayog, 2018). The country's 80 per cent of total area under pulse production was from six states, viz., Madhya Pradesh (24.94 per cent), Rajasthan (17.77 per cent), Maharashtra (14.51 per cent), Karnataka (10.07 per cent), Uttar Pradesh (7.56 per cent) and Andhra Pradesh (4.69 per cent), which produced nearly 80 per cent of the total pulses production in 2017-18. Gram, Urad, Arhar (Tur), Moong and Lentil are the major pulses produced and consumed in India. Gram (chickpea) is the most dominant pulse with an average share of around 45 per cent in total pulse production during 2017-18. Based on available data for 2017-18 (Table 1.3), the share of area under gram to total pulses area was 35.21 per cent followed by urad (18.14 per cent), tur/arhar (14.77 per cent), moong (14.21 per cent), lentil (5.17 per cent) and other pulses accounted for (12.50 per cent), (Govt. of India, 2018).

Table 1.3: Area and production of major pulses in India during 2017-18.

Pulses	Area (MH)	% of Area	Production (MMT)	% of Production
Gram	10.56	35.21	11.23	44.51
Urad	5.44	18.14	3.56	14.10
Arhar/Tur	4.43	14.77	4.25	16.85
Moong	4.26	14.21	2.01	7.97
Lentil	1.55	5.17	1.61	6.36
Others	3.75	12.50	2.57	10.19
Total	29.99	100.00	25.23	100.00

Source: Compiled from various publications/reports of MoA& FW, GoI.

Current pulses scenario in India shows that domestic supply of pulses was not able to meet the rising demand from domestic consumers. This was due to the fact that different parts of the country had dietary preferences for specific type of pulses. An interesting behaviour of consumption that has been observed for pulses in India, is that there is very little substitution among different types of pulses (Joshi and Rao, 2017). Besides, more than 83 per cent area under pulses is rainfed with limited input requirements, high degree of risks associated with production, inadequate price

incentives for the farmers to produce pulses (Verma, et al. 2019) and so on. As a result, government intervention in pulses' production has assumed significance.

The available data for TE 2006-07 shows that the area under pulses in India was 227.60 lakh hectares, which increased to 259.70 lakh hectares during TE 2016-17, registering an increase of 14.1 per cent. Similarly, the production increased from 135.81 lakh MTs in TE 2006-07 to 188.70 lakh MTs during TE 2016-17, accounting an increase of 38.9 per cent. The yield rate during the TE 2006-07 to TE 2016-17 also increased from 597 kg per hectare to 727 kg per hectare (an increase of 21.8 per cent). Major pulse growing states (Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh, Karnataka, Andhra Pradesh, Chhattisgarh, Gujarat, Odisha, Bihar, Tamil Nadu, Jharkhand, West Bengal and Haryana) occupied about 94 per cent of the country's total pulse area in TE 2006-07, which slightly increased to about 96 per cent during the TE 2016-17.

Similarly, the production in these major pulse growing states was about 98 per cent during TE 2006-07 and 2016-17. Moreover, the yield rate in 8 major pulse growing states was higher than the average of all-India figure during TE 2006-07 and TE 2016-17 as well (Table 1.4). Thus, given the fact that these states occupied lion's share of area as well as production of pulses, these 14 major pulses growing states may be termed as 'Pulse Road of India'.

Table 1.4: Area, production and yield of pulses in major states in India

State	Area (In lakh ha)		Production (In lakh MT)		Yield (Kg/ha)	
	TE	TE	TE	TE	TE	TE
	2006-07	2016-17	2006-07	2016-17	2006-07	2016-17
Andhra Pradesh	18.57	13.00	12.57	10.36	677	797
Bihar	6.21	5.35	4.51	4.59	726	858
Chhattisgarh	9.30	8.73	4.38	6.70	471	768
Gujarat	8.29	7.03	5.40	6.46	651	919
Haryana	1.81	0.90	1.35	0.67	746	744
Jharkhand	3.13	6.63	1.97	6.44	629	971
Karnataka	21.52	27.03	8.83	14.23	411	526
Madhya Pradesh	43.04	60.17	32.88	54.75	664	910
Maharashtra	35.48	37.70	19.91	24.55	561	651
Odisha	7.47	7.85	3.13	4.32	419	550
Rajasthan	34.08	41.67	12.39	23.75	364	570
Tamil Nadu	5.33	8.50	2.38	5.94	447	699
Uttar Pradesh	27.60	22.47	21.94	20.14	795	896
West Bengal	2.22	2.90	1.65	2.87	743	990
Others	3.55	9.77	2.42	2.63	682	269
All India	227.60	259.70	135.81	188.70	597	727

Source: Compiled from various issues of Agricultural Statistic at a Glance, MoA& FW, GoI.

Due to increasing awareness about significant nutritional qualities of pulses, there has been a soaring demand for pulses, especially among the vegetarians. Not only does it form an important component of nutrition, but it is also crucial for achieving ecological sustainability owing to their key role in improving soil fertility.

1.2 Studies on cultivation of pulses

Studies in the 1980s and early 1990s revealed that area under pulses is mostly predetermined, but as the irrigated area increases, pulses are relocating to rainfed areas and their area is replaced by cereals or some cash crops (Singh and Singh, 1995). In India, the irrigated area under pulses is only 12 per cent, while under wheat and paddy it is more than 60 per cent of the total area (Reddy and Reddy, 2010).

Poor soil and agro-climatic conditions not only compel late sowing of legumes but also lead to reduced length of growing period which also necessitate to sustain cold injuries at early vegetative phase which freezes all biological activities for prolonged period. A sudden rise in temperature later not only induces forced maturity but simultaneously invites several biotic stresses viz., diseases and insects pests (Ali *et al.*, 2012; Reddy, 2009 and Singh and Singh, 2008). Traditionally rabi pulses sowing were delayed up to last week of November and some time under extreme circumstances it goes up to the first fortnight of December (Singh *et al.*, 2012 and Ramakrishna *et al.*, 2000). Improper sowing time, low seed rate, defective sowing methods, insufficient irrigation, inadequate intercultural operations, sowing under area without proper management are major agronomic constraints (Ramakrishna *et al.*, 2000 and Reddy, 2009) in cultivation of chickpea. Additionally, plants get comparatively less time to complete their lifecycle which by and large forces maturity (Ramakrishna *et al.*, 2000). Typically, late sown rabi pulses especially lentil and chick pea undergo three distinct phases and considerable degrees of phenological modifications are bound to happen. This poses serious threat to realization of yield potential due to cold injuries. This phase is very important for creating source of channelizing the energy at later stage. In the last and most important phase lentil faces heat injury, resulting in early onset of reproductive phase, causing imbalance in resources and inputs, biotic stress and forced maturity (Joshi, 1998; Dixit *et al.* 2009; Reid *et al.*, 2011 and Singh and Bhatt, 2013).

1.3 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 and 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 desired 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.

1.4 Objectives of the study

The objectives of the study are as follows:

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.

1.5 Data and methodology

In Karnataka the study is carried out by the ADRTC (Agricultural Development and Rural Transformation Centre) Bengaluru. For the selection of sample two districts are selected, one irrigated (Mysore) and one dryland (Tumkur) based on highest seed minikits distributed in Karnataka during the reference period of 2017-18 as well as 2018-19. Among the selected districts, 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 Karnataka.

To see whether seed minikits are being used to replicate seeds and use the reproduced seed to expand area in the forthcoming years, we tried to include the cases of seed minikits distributed 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. While selecting the households, the sample was included for both these years. We avoided those farmers who received seed minikits distributed in the year 2019-20 as at the time of survey it would not be feasible to check the replication and reproductive use of seed minikits received during 2019-20. During the field survey, we collected information on area sown, productivity and resources used for seed minikits pulse crops as well as the reproduced seed pulse crops.

1.6 Seed mini-kits programme

The aim of seed mini-kits programme

Seed Mini-kits programme is meant for introduction and popularization of latest released / pre released varieties /hybrids not older than 10 years among the farmers free of cost or on nominal charges. Central Seed Agencies deliver allotted seed minikits to the destination identified by the beneficiary states within the stipulated time. Seed minikits are distributed for rice, wheat, pulses and

nutri-cereals. The agencies like NSC, HIL, KRIBHCO, NAFED, IFFCO, IFFDC and Central Multi-state Cooperatives such as NCCF, SSCs etc., are involved in supply of seed minikits at the national level.

The price of seed minikits is fixed by the NFSM Mission Director at National level and 100 per cent cost is reimbursed to the agencies on certification of receipt by the state. The allocation of seed minikits is approved by the NFSM-EC before commencement of Kharif/Rabi/Summer seasons. The cut off dates of delivery of Seed Minikits consignment by the Central Agencies to reach the destination is 15th May, for kharif season, 1st September for rabi Season, 1st October for rabi season and 31st January for the summer season. Bill submission date for kharif is before 10th May, 15th October for rabi season and 10th February for summer season. The required leaflets on cultural practices should be kept in the seed Minikits along with Rhizobium /PSB culture wherever it is required in the respective seed packet of Minikits. The cultural practices should be printed in Hindi, English and local languages for the respective states. The agencies should deliver the consignment up to District headquarters level of the respective State Governments, beyond which the distribution of Seed Minikits should be taken care by the State Department of Agriculture. After receiving the minikits at destination place of the district, proper distribution of minikits within 10 days to the appropriately identified farmers must be ensured by the District Level Agriculture Officer, concerned. The purpose is to ensure, that the identified farmer is capable of raising the crop with care and diligence such that the plot serves as a good demonstration to other farmers. Only one minikit per farmer and not more than 3 minikits in a season and a village are to be distributed. The re-imburement of the cost of seed minikits supplied within due date only by Central Seed Agencies will be reimbursed by Crops Division on receipt of original bills supported with utilization certificate and first and final bill certificate with proper acknowledgement issued by NFSM State Nodal Officer.

Implementation of seed mini-kits programme

NFSM-Pulses is one of the components of the centrally sponsored scheme of National Food Security Mission 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 covering all the districts in 14 states by merging all pulses components of another centrally sponsored scheme namely Integrated Scheme on Oilseeds, Pulses, Oilpalm and Maize (ISOPOM). Ten districts of Assam and 15 districts of Jharkhand have also been included under NFSM-Pulses.

A3P: Accelerated Pulses Production Programme (under NFSM) is another step forward for vigorous implementation of the pulse development under the NFSM-Pulses. 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. A3P will have a strong mechanism of monitoring of the programme. Close monitoring of the physical achievements in terms of provision of input minikits, seed minikits and overseeing the activities of the technical assistants is to be done by the District Food Security Mission Executive Committee (DFSMEC). **Directorate of Pulses Development (DPD)** is the nodal agency for allocation and monitoring of supply of pulses minikits to states. However, Commodity Development Directorate in-charge of concerned pulses states provide the information on seed supply position to DPD. (NFSM, A3P Operational guidelines)

Eligibility

- 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 Women farmers 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, Schedule caste and Schedule tribal 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 during last three years.
- Priority will be given to those farmers having irrigation facilities.

Application process

- For any query regarding minikits anyone can contact to Agriculture Supervisor of concerned Gram Panchayat.
- Agriculture supervisor may prepare a list of three times more women farmers with the consultation of Gram Panchayat's Sarpanch and other elected leaders and minikits will be distributed by lottery system. The **time Line is** 15 days before sowing and the **Dealing Authorities at different levels** are given below:
 - Gram Panchayat level: Agriculture Supervisor
 - Panchayat Samiti level: Assistant Agriculture officers.
 - Sub District level: Assistant Director Agriculture (Ext).
 - District level: Dy. Director Agriculture (Ext).

Seed minikit distribution of pulses:

In order to promote quick spread of new varieties of pulses, minikits of pulses seed varieties not older than 10 years are provided free of cost to farmers. 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, urd and pigeon pea. This quantity would be sufficient to plant 0.2 ha., each. In addition, under this package, Karnataka state governments 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. 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. Table 1.5 provides pulses status in major producing states in India, crop and season-wise as well as leading districts in Karnataka.

Table 1.5: Pulses status in India as per area sown

Pulses	State wise status for India (2016-17, DES)		District wise status for Karnataka (2017-18, DES)	
	1 st	2 nd and 3 rd	1 st	2 nd and 3 rd
Tur/ Pigeon pea	Maharashtra	Karnataka	Gulbarga	Bijapur and Bidar
Urad / Blackgram	Uttar Pradesh	Andra Pradesh and Rajasthan (Karnataka stands 7 th)	Gulbarga	Bidar and Mysore
Bengal Gram / Gram	Maharashtra	Rajasthan and Karnataka	Bijapur	Gulbarga and Gadag
Greengram / Moong	Rajasthan	Maharashtra and Karnataka	Gulbarga	Gadag and Bagalkot

1.7 Overview of the report

The report is divided into five chapters. The first chapter presents background, the main purpose of the seed minikits programme, eligibility criteria to participate in the scheme, the main objectives of the study, database and methodology followed to fulfill the objectives of the study. The second chapter presents details about the pulses produced in Karnataka, their decadal growth rate, area production and productivity of pulses in the states and districts. The status of selected crops namely, red gram, green gram and black gram and their growth pattern in the state. The last section presents the trends in the distribution of seed minikits in pulses in the state and basis of selecting crops and districts for the primary survey. Chapter three presents socio-economic characteristics of the selected households, their cropping pattern, productivity, cost, revenue and net farm business income of the selected households. Chapter four begins by presenting economic assessment of the selected pulse crops, i.e., crop productivity, cost and net revenue of the selected pulse crops. It further provides employment and marketing channels for the selected pulse crops. The chapter then analyses the efficiency aspects of seed minikits distribution as well as problems faced by farmers,

their opinion about the programme and their suggestions to further improvise the programme. The last chapter provides summary of findings and suggestions to further improve the programme.

Chapter – II

Production of Pulses in Karnataka

2.1 Macro overview of state agriculture

Agriculture is an important constituent of the economy of Karnataka state. The state's contour, soil and climatic conditions together contribute immensely towards growing various agricultural commodities. About 123,100 km² (i.e., 12.31 million hectares) of land, i.e., 64.6 percent of the total area is used for agriculture in Karnataka and it remains one of the main occupations of the people in the state. As per the population Census 2011, agriculture supports 13.74 million workers, of which 23.61 per cent are cultivators and 25.67 per cent are agricultural workers. Nearly 61 percent of Karnataka's population lives in rural areas, and 54.6 percent of the state's workforce is employed in agriculture and allied activities. Agriculture of Karnataka is mainly dependent on monsoon, as only 26.6 percent of land is supported by irrigation. Agriculture in the state can be classified into three main seasons during the year, viz.: Kharif (June to September); Rabi (October to February); and Summer (March to May).

Some of the important crops that form the basis of agriculture in Karnataka are: rice, jowar, maize, pulses, oilseeds, cashew-nuts, coconut, arecanut, cardamom, chillies, cotton, sugarcane, coffee, tobacco etc. Karnataka is the largest producer of coffee, coarse cereals and raw silk among all states in India. Horticulture also plays a vital role in the economy of Karnataka. The state is the major producer of horticultural commodities. About 40 percent of the total Income of the state is generated from horticulture. Karnataka occupies the second position in terms of the horticultural productions in India.

The agriculture and allied sector's contribution to Karnataka's GSDP was around 43 percent in 1980-81 that came down to 26 per cent in 2001-02 and further to 16.8 percent during 2007-08. The latest estimates show that agriculture's contribution in the state GSDP is merely 90 per cent as per data of 2019-20. Despite the declining share of primary sector in GSDP, agriculture remains the primary activity and main livelihood source for the rural population in the state. Besides, agriculture provides raw material for a large number of industries. Agriculture in the state is characterized by wide crop diversification. The extent of arid land in Karnataka being second only to Rajasthan in the country, agriculture is highly dependent on the vagaries of the southwest monsoon. The most important challenge faced by agriculture in the state is food security, besides improving the livelihood of the farmers. Karnataka has attained self-sufficiency in food grains especially in the course cereals and pulses, but still continues to be in deficit in rice and oilseeds (Kumar 2010). Development of agriculture improves the purchasing power of the major section of our population, which in turn will also help the development of other industries.

Karnataka also enjoys the credit of having pioneered organic farming policy before any other Indian states. The state brought out an **‘Organic Farming Policy’ way back in March 2004**. Starting with small numbers, with a handful of farmers working on bringing about the change almost a decade ago, today Karnataka has anywhere between 75 thousand hectares to 1.12 lakh hectares of farming land producing organic crops and vegetables. Majority of this, nearly 51 thousand hectares has already been certified under organic cultivation. That is no mean feat, as it takes close to three years to convert lands to organic from conventional farming methods. The main objective of this policy was to increase food security and achieve sustainability with the judicious use of precious land and water resources along with equipping farmers to effectively mitigate the drought situation. The policy also aimed at enhancing soil fertility and creating soil that was ‘living’. Further, this would be used to increase rural employment and create opportunities for youth in the area, thereby checking migration while making farmers self-dependent and also reducing the burden of debt. Thus, it can be concluded that agriculture is an important part of the economy of Karnataka.

2.2 Area and production of major crops in the state

Karnataka state is the leading producer of pulses and oilseeds, the two commodities in which India has deficit in supply over demand and thereby these commodities constitute major items in the country’s import bill. Besides Karnataka also plays a vital role in the production of horticultural commodities. The pulses constituted around 11.6 per cent area in India and around 8 per cent share of production in 2018-19. Pulses production in Karnataka increased from around 8 lakh tones in TE 1990-91 to around 13.5 lakh tones in TE 2012-13 (Table 2.1). It further increased to 18.6 lakh tonnes in 2018-19. Similarly, oilseeds in Karnataka constituted around 4.2 per cent of area in all India and it occupied 2.8 per cent share in all India production of oilseeds in 2018-19. Among oilseeds, sunflower area and production in Karnataka constituted the number one rank in India with 63 per cent share in area and 54 per cent share in production during 2018-19. The aggregate oilseeds production in Karnataka increased from 14 lakh tones in TE 1990-91 to 18 lakh tones in TE 1993-94 but subsequently it declined incessantly. The oilseeds production in TE 2002-03 declined to 12 lakh tones which further declined to 9 lakh tones in 2018-19.

Unlike oilseeds, in the case of coarse grains, although area declined over time but production increased in Karnataka as also happened all over India. Karnataka occupied 13.5 per cent area share and 13 per cent production share in India in coarse grains in 2018-19. Total production of coarse grains in Karnataka increased from 37 lakh tones in TE 1990-91 to 69 lakh tones in TE 2012-13. However, like oilseeds, production of coarse grains also have been going through a declining trend in the recent period as in 2018-19 total production fell to 55 lakh tones which was measured 66 lakh tones in 2017-18. Rice production in the state increased from 24 lakh

tones in TE 1990-91 to 39 lakh tones in TE 2011-12 but declined to 30.6 lakh tones in TE 2016-17. The state occupied 3 per cent share in area in India and 3.5 per cent share in production of rice. In the case of horticultural crops, the area share of Karnataka to all India area under horticultural crops was 8.3 per cent while its production share was 6 per cent in the year 2018-19. The overall production of horticultural crops in the state increased from 32 lakh tones in TE 1992-93 to 152 lakh tones in the TE 2012-13 and further to 188 lakh tones in 2018-19.

Table 2.1: Area and production of major crops in the state
(Area in lakh hectares, production in lakh tones)

Year	Rice		Coarse cereals		Pulses		Food grains		Oilseeds		Horticultural crops	
	Area	Prod	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.
TE 90-91	11.98	24.34	42.37	36.97	23.51	7.55	80.14	70.13	23.71	13.78	0.00	0.00
TE 91-92	12.08	25.39	41.62	38.99	24.34	8.94	80.19	74.51	25.99	15.20	4.16	31.86
TE 92-93	12.53	27.70	40.54	41.03	24.59	9.37	79.72	79.51	27.69	16.39	8.48	64.37
TE 93-94	13.20	31.40	39.90	45.03	24.04	8.92	79.33	87.09	29.61	17.31	12.97	104.46
TE 94-95	13.29	31.40	39.51	45.03	23.30	8.92	78.45	87.09	28.21	17.31	13.45	104.46
TE 95-96	13.12	31.25	38.52	45.30	22.35	9.19	76.32	87.43	27.69	17.24	14.00	110.37
TE 96-97	13.06	31.34	38.98	46.72	20.96	8.52	75.37	88.28	25.96	16.80	14.78	116.26
TE 97-98	13.26	31.49	38.72	46.96	18.66	7.21	73.03	87.18	24.67	15.67	15.14	111.87
TE 98-99	13.80	33.60	38.88	48.91	17.59	6.42	72.83	90.70	24.07	15.46	15.30	110.15
TE 99-00	14.10	35.29	39.03	48.90	18.07	6.84	73.81	92.88	21.99	13.58	15.23	103.43
TE 00-01	14.53	37.40	39.73	54.63	19.29	8.51	76.21	102.81	21.11	14.71	15.32	110.73
TE 01-02	14.50	35.99	38.75	51.76	19.53	8.52	75.41	98.47	18.78	12.51	15.58	106.95
TE 02-03	13.52	31.57	37.17	46.28	20.00	8.00	73.27	87.82	18.85	12.12	15.65	104.26
TE 03-04	12.16	27.25	36.22	37.64	19.43	6.71	70.27	73.08	20.03	10.09	15.69	94.62
TE 04-05	11.79	28.29	37.24	42.52	20.14	6.85	71.56	79.07	23.16	11.93	15.84	94.13
TE 05-06	12.89	39.47	38.29	52.96	19.87	7.75	73.47	101.82	25.99	14.06	16.07	103.02
TE 06-07	13.96	42.46	37.32	58.65	21.52	8.83	75.35	111.94	26.28	14.70	16.69	116.68
TE 07-08	14.32	43.02	36.95	61.87	22.44	10.41	76.38	117.58	24.96	14.63	17.13	129.80
TE 08-09	14.42	36.55	36.00	60.84	22.80	10.43	75.93	110.20	22.69	12.95	17.63	134.43
TE 09-10	14.72	37.37	36.98	63.64	23.16	11.18	77.62	114.72	21.52	12.55	18.21	140.28
TE 10-11	15.14	38.94	36.50	66.65	24.53	12.18	78.85	120.36	19.34	11.62	18.67	145.42
TE 11-12	14.81	39.45	36.13	68.51	25.25	12.72	78.73	123.09	16.80	10.72	18.95	151.63
TE 12-13	14.12	38.36	35.46	69.03	24.51	13.52	76.52	123.11	14.77	10.35	18.74	152.23
TE 13-14	13.45	36.31	34.92	65.63	23.53	13.64	74.18	117.55	14.05	9.99	18.81	155.72
TE 14-15	13.15	34.93	34.48	66.07	23.57	14.50	73.38	117.69	13.91	10.05	19.08	176.55
TE 15-16	12.59	33.78	33.54	64.60	25.45	13.76	73.51	114.24	13.56	9.57	19.90	197.20
TE 16-17	11.57	30.56	32.50	59.45	27.01	14.22	72.88	106.19	13.17	8.38	20.47	211.25

Source: DES, GoK

In Karnataka, the share of pulses to gross cropped area was around 20 per cent during the early 1990s (Table 2.2). It came down to less than 15 per cent in the late 1990s but picked up after the beginning of several pulse's promotion programmes like ISOPOM and National Food security Mission which were started in the mid-2000s. During the later years of 2010, its share surpassed 20 per cent and at present it is near 25 per cent of the gross cropped are in the state (Table 2.2). We can see from the cropping pattern that oilseeds occupied 20-23 per cent area in gross cropped area in Karnataka in the 1990s, which came down to around 15 per cent in mid 2000s and 10-12 per cent in mid 2010. The area share went down further to less than 8 per cent during the latest statistics of 2018-19. Thus, area under oilseeds has almost come to half as compared to early 1990s. Against oilseeds, area under horticultural crops has increased in the state over time. Their share in gross cropped area was only 3.5 per cent in TE 1991-92 that leapfrogged to above 10 per cent in TE

1994-95 and further increased to above 15 per cent in TE 2012-13. At present their share is around 15-17 per cent of the gross cropped area in the state. Total area under horticultural crops in the state increased from 13.5 lakh hectares in TE 1994-95 to above 20 lakh hectares in TE 2016-17, much above that of oilseeds crops which occupied only 13 lakh hectares of area (Table 2.1 and 2.2).

Table 2.2: Cropping pattern in Karnataka (percentage of gross cropped area)

Year	Rice	Coarse cereals	Pulses	Food grains	Oilseeds	Horticultural crops	Other crops	Cropped Area
TE 90-91	10.07	35.61	19.76	67.36	19.93	0.00	12.72	100.00
TE 91-92	9.99	34.43	20.13	66.33	21.50	3.44	8.73	100.00
TE 92-93	10.28	33.26	20.18	65.41	22.72	6.96	4.91	100.00
TE 93-94	10.63	32.15	19.37	63.91	23.86	10.45	1.78	100.00
TE 94-95	10.82	32.16	18.96	63.85	22.96	10.95	2.24	100.00
TE 95-96	10.81	31.75	18.42	62.90	22.82	11.54	2.74	100.00
TE 96-97	10.79	32.21	17.32	62.28	21.45	12.21	4.06	100.00
TE 97-98	11.05	32.28	15.56	60.88	20.57	12.62	5.94	100.00
TE 98-99	11.39	32.10	14.52	60.12	19.87	12.63	7.38	100.00
TE 99-00	11.72	32.43	15.01	61.33	18.27	12.65	7.74	100.00
TE 00-01	11.88	32.48	15.77	62.31	17.26	12.53	7.91	100.00
TE 01-02	12.07	32.25	16.25	62.75	15.63	12.96	8.65	100.00
TE 02-03	11.43	31.42	16.91	61.94	15.94	13.23	8.89	100.00
TE 03-04	10.53	31.36	16.82	60.83	17.34	13.58	8.24	100.00
TE 04-05	9.88	31.22	16.88	59.98	19.41	13.28	7.33	100.00
TE 05-06	10.37	30.81	15.99	59.12	20.91	12.93	7.04	100.00
TE 06-07	10.94	29.25	16.87	59.07	20.60	13.08	7.25	100.00
TE 07-08	11.20	28.90	17.55	59.74	19.52	13.40	7.34	100.00
TE 08-09	11.48	28.65	18.14	60.42	18.06	14.03	7.49	100.00
TE 09-10	11.58	29.09	18.22	61.07	16.93	14.33	7.68	100.00
TE 10-11	11.86	28.59	19.21	61.76	15.15	14.62	8.47	100.00
TE 11-12	11.69	28.53	19.94	62.16	13.26	14.96	9.61	100.00
TE 12-13	11.49	28.85	19.94	62.26	12.02	15.25	10.47	100.00
TE 13-14	11.19	29.04	19.57	61.69	11.68	15.64	10.98	100.00
TE 14-15	10.88	28.53	19.50	60.71	11.51	15.79	12.00	100.00
TE 15-16	10.34	27.55	20.90	60.38	11.14	16.35	12.13	100.00
TE 16-17	9.50	26.70	22.19	59.87	10.82	16.81	12.50	100.00
2018-19	8.62	24.54	26.24	59.41	7.36	15.64	17.60	100.00

Source: DES, GoK

Rice, on the other hand, maintained not only its share in gross cropped area but also its absolute amount of area under the crop. Rice area stagnated or slightly increased from 10 per cent of the gross cropped area in the TE 1990-91 to 11.5 per cent in TE 2012-13 but came down to 9.5 per cent in TE 2016-17 thus almost maintaining its area over time. The percentage of area under food grains to gross cropped area declined from around 67 per cent in TE 1990-91 to 60 per cent in TE 2016-17 mainly because of massive decline in area under coarse grains (mainly ragi and jowar) from 42 lakh hectares in TE 1990-91 to 32 lakh hectares in TE 2016-17. The share of coarse grains in gross cropped area declined from 35.6 per cent in TE 1990-91 to 26.7 per cent in TE 2016-17. The share of other crops increased from 8 per cent in TE 1991-92 to more than 12.5 per cent in TE 2016-17. Thus, there was diversification taking place in the state from food grains to nonfood grains and from low value cereals and oilseeds to high value horticulture and other cash-oriented crops (Tables 2.1 and 2.2).

As stated in the previous chapter, to promote quick spread of new varieties of pulses, minikits of pulses seed varieties not older than 10 years were provided free of cost to farmers. In Karnataka, the seed mini-kits were distributed for green gram, black gram and red gram to the farmers under this scheme. Table 2.3 provides area and production of these three pulses and their share in total pulses grown in the state during TE 1990-91 to TE 2016-17. It is discernible from the statistics in the table that among these three pulse crops, there was perceptible increase in area and production only in red gram (tur) as compared to black gram (urad) and green gram (moong). Area under black gram was almost stagnant at around 1 lakh hectares during the above mentioned period while green gram area slightly increased from 2.4 lakh hectares in TE 1990-91 to around 3.5 lakh hectares in TE 2016-17. On the other hand area under red gram, i.e., tur crop increased from around 5 lakh hectares in the early 1990s to 8.7 lakh hectares in TE 2016-17. Similarly, production of black gram and green gram remained stagnant at around 50 thousand and less than 1 lakh tones, respectively in the entire period from 1990-91 to 2016-17. Production of tur, on the other hand increased from 1.7 lakh tones in TE 1990-91 to more than 5 lakh tones in TE 2016-17, an increase of almost three times. Jointly, these three pulse crops contributed around 1/3rd share in area and production of total pulses in the state in the early 1990s whereas their share in area and production increased to slightly less than half by TE 2016-17. The increase in share in both area and production was mainly contributed by red gram whereas share of other two pulses in production declined during the reference period.

Table 2.3: Area and production of three pulse crops for which seed mini-kits distributed in Karnataka

Year	Area in lakh hectares, production in lakh tones						Percentage of total area and production of pulses						Sum of three pulses	
	Black Gram		Red Gram		Green Gram		Black Gram		Red Gram		Green Gram		% area share	% production share
	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.	Area	Prod.		
TE 90-91	0.00	0.00	4.81	1.67	2.44	0.93	0.00	0.00	20.46	22.12	10.38	12.32	30.84	34.44
TE 91-92	1.16	0.48	4.84	1.8	2.83	1.14	4.77	5.37	19.88	20.13	11.63	12.75	36.28	38.26
TE 92-93	1.18	0.56	4.73	1.48	3.01	1.24	4.80	5.98	19.24	15.80	12.24	13.23	36.27	35.01
TE 93-94	1.16	0.55	1.16	0.55	2.6	0.65	4.83	6.17	4.83	6.17	10.82	7.29	20.47	19.62
TE 94-95	1.17	0.55	1.17	0.55	2.08	0.65	5.02	6.17	5.02	6.17	8.93	7.29	18.97	19.62
TE 95-96	1.19	0.64	1.19	0.64	1.84	0.54	5.32	6.96	5.32	6.96	8.23	5.88	18.88	19.80
TE 96-97	1.31	0.52	1.31	0.52	2.34	0.58	6.25	6.10	6.25	6.10	11.16	6.81	23.66	19.01
TE 97-98	1.39	0.53	1.39	0.53	2.49	0.57	7.45	7.35	7.45	7.35	13.34	7.91	28.24	22.61
TE 98-99	1.42	0.38	1.42	0.38	2.92	0.56	8.07	5.92	8.07	5.92	16.60	8.72	32.75	20.56
TE 99-00	1.31	0.38	1.31	0.38	3.12	0.79	7.25	5.56	7.25	5.56	17.27	11.55	31.77	22.66
TE 00-01	1.33	0.45	1.33	0.45	3.78	1.24	6.89	5.29	6.89	5.29	19.60	14.57	33.39	25.15
TE 01-02	1.42	0.5	1.42	0.5	3.58	1.26	7.27	5.87	7.27	5.87	18.33	14.79	32.87	26.53
TE 02-03	1.57	0.46	1.57	0.46	3.7	0.92	7.85	5.75	7.85	5.75	18.50	11.50	34.20	23.00
TE 03-04	1.56	0.4	1.56	0.4	3.12	0.46	8.03	5.96	8.03	5.96	16.06	6.86	32.12	18.78
TE 04-05	1.46	0.26	1.46	0.26	4.03	0.51	7.25	3.80	7.25	3.80	20.01	7.45	34.51	15.04
TE 05-06	1.28	0.27	1.28	0.27	3.99	0.72	6.44	3.48	6.44	3.48	20.08	9.29	32.96	16.26
TE 06-07	1.3	0.22	1.3	0.22	4.57	0.76	6.04	2.49	6.04	2.49	21.24	8.61	33.32	13.59
TE 07-08	1.4	0.38	1.4	0.38	4.59	0.85	6.24	3.65	6.24	3.65	20.45	8.17	32.93	15.47
TE 08-09	1.4	0.4	1.4	0.4	4.17	0.68	6.14	3.84	6.14	3.84	18.29	6.52	30.57	14.19
TE 09-10	1.31	0.36	1.31	0.36	3.94	0.65	5.66	3.22	5.66	3.22	17.01	5.81	28.32	12.25
TE 10-11	1.19	0.29	1.19	0.29	3.52	0.65	4.85	2.38	4.85	2.38	14.35	5.34	24.05	10.10
TE 11-12	1.13	0.31	1.13	0.31	3.58	0.77	4.48	2.44	4.48	2.44	14.18	6.05	23.13	10.93
TE 12-13	1.1	0.44	1.1	0.44	2.9	0.79	4.49	3.25	4.49	3.25	11.83	5.84	20.81	12.35
TE 13-14	1.02	0.46	4.52	2.15	2.63	0.69	4.33	3.37	19.21	15.76	11.18	5.06	34.72	24.19
TE 14-15	0.94	0.41	4.71	2.29	2.53	0.62	3.99	2.83	19.98	15.79	10.73	4.28	34.71	22.90
TE 15-16	0.88	0.32	7.36	4.35	3.1	0.59	3.46	2.33	28.92	31.61	12.18	4.29	44.56	38.23
TE 16-17	0.83	0.30	8.66	5.42	3.44	0.71	3.07	2.11	32.06	38.12	12.74	4.99	47.87	45.22

Source: DES, GoK

Table 2.4 presents growth rate in area and yield of major foodgrain crops in Karnataka during the decade of 1988-89 to 1997-98, 1998-99 to 2007-08 and 2008-09 to 2017-18. The glance on statistics in the table presents a very interesting picture. Among the three constituents of food grains grown in Karnataka, area under coarse grains saw negative growth rate throughout the three decades without any exception, although negative growth rate was not significant during the middle decade of 1998-99 to 2007-08. Rice area underwent significant increase in the first decade (1988-89 to 1997-98) while growth in area was negative but insignificant during the second decade (1998-99 to 2007-08). In the third decade (2008-09 to 2017-18) area under rice also declined significantly at a rate of -4.8 per cent per annum. Against, mostly the negative growth in area of rice and course cereals, pulses saw significant negative growth in area in the first decade but underwent significant positive growth in area at the rate of 2.5 and 3 per cent per annum during the second and third decade, respectively.

Table 2.4: Growth rate in area and yield rate of major food grain crops in the state (%)

	Rice		Course cereals		Food grains		Pulses		Black Gram		Red Gram		Green Gram	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield	Area	Yield
1988-89 to 1997-98	1.388 (3.16)	2.19 (5.35)	-1.30 (-3.4)	4.09 (3.76)	-1.38 (-4.9)	4.03 (5.17)	-3.46 (-3.4)	1.24 (0.63)	4.14 (3.38)	-11.0 (-1.4)	-2.54 (-1.6)	1.51 (0.41)	-0.59 (-0.2)	-7.59 (-3.4)
1998-99 to 2007-08	-0.39 (-0.3)	1.60 (0.87)	-0.77 (-1.4)	2.99 (1.21)	0.21 (0.42)	1.73 (0.78)	2.43 (3.53)	0.69 (0.35)	0.62 (0.4)	-4.54 (-1.0)	3.08 (3.96)	3.33 (1.18)	4.48 (1.71)	-6.04 (-1.1)
2008-09 to 2017-18	-4.81 (-7.6)	1.04 (1.73)	-1.33 (-3.9)	0.25 (0.22)	-0.59 (-1.3)	-0.58 (-0.6)	2.93 (2.66)	2.32 (1.33)	-1.74 (-0.8)	8.86 (1.99)	4.33 (2.05)	4.08 (1.51)	2.21 (0.72)	5.74 (1.4)
2012-13 to 2013-14**	4.77	1.37	-0.40	13.28	3.39	7.74	10.58	6.58	-7.27	1.74	24.85	28.57	82.86	-14.8
2013-14 to 2014-15**	-1.05	0.16	-4.07	6.08	-4.67	4.29	-7.40	-6.21	-31.37	-38.80	-11.65	-8.68	-17.8	-20.4
2014-15 to 2015-16**	-16.29	1.92	-3.76	-16.10	2.00	-19.85	22.05	-32.87	30.00	-8.43	-9.75	-43.43	32.32	-37.40
2015-16 to 2016-17**	-6.85	-7.44	-1.37	-4.53	0.23	-1.53	5.06	45.27	-3.30	77.86	84.78	103.3	20.60	118.2
2016-17 to 2017-18**	-3.97	20.61	8.15	15.43	4.10	15.65	1.96	10.12	54.55	3.56	-27.10	15.05	-5.48	23.90

Note: *The growth rates for the decennial period are based on semi log time trend and the figures in parentheses are respective 't' values.

** Growth rates are based on annual averages.

Source: DES, GoK.

Against the negative trends in area, the yield growth was observed positive throughout the period of three decades not only among pulses but also in rice as well as coarse grains. The rice yield observed 2.2 per cent per annum growth which declined to 1.6 per cent in the second decade and further to 1 per cent in the third decade. Moreover, growth was significant in the first decade but remained insignificant in second and third decades. In a similar way, coarse grains' yield observed 4 per cent per annum growth in the first decade which declined to 3 per cent in the second decade and almost nil growth in the third decade. Again like rice growth in yield of coarse cereals was significant only in the first decade. In the case of pulses, although increase in area was consistent with significant growth, the yield rate was insignificant throughout the three decades' period with volume remaining only 1-2 per cent per annum. The lack of significant positive growth in yield in pulses was possibly caused by the dry-land nature of pulses in the state and also due to

rising uncertainty in rainfall pattern and fluctuating temperature due to the effect of climate change in the recent past.

Summarizing the growth rates in area and yield of three individual pulse crops namely, black gram, red gram and green gram, very interesting statistics can be seen from the table. Whereas black gram observed significant positive growth in area during the first decade, the area growth in other two pulses remained negative and insignificant during this period. On the opposite, growth rate in area of black gram during the next two decades remained insignificant and negative or negligible. Growth in area under red gram and green gram during the next two decades, on the other hand, was positive and mostly significant. The above analysis of area growth indicates some diversification within pulses happening in Karnataka from black gram toward red gram and green gram. Yield growth in the three pulses mostly remained insignificant although the growth rate was high and positive in all the three pulses during the last decade. Last but not the least, the annual growth in area and yield during the recent period of 2012-13 to 2018-19 also show huge fluctuations in annual growth rates in area and yield of these food grain crops highlighting the dry land nature of agriculture in Karnataka as indicated elsewhere.

2.3. Pulse production in Karnataka – District level analysis

Table 2.5 presents statistics on the geographical, cultivable and pulses area in Karnataka at the district level for TE 2006-07 and TE 2016-17. There is a decline in cultivable (geographical) area of Bangalore Rural, Bangalore Urban, Gulbarga and Kolar districts because of redefining the boundaries or carving out of new districts. Ramanagara, Chikkaballapura and Yadgir were the new districts carved out from the above. At the aggregate, there was a slight decline in cultivable area in Karnataka from 2006-07 to 2016-17 because of increasing non-agricultural uses of land. Cultivable area declined from 12.90 million hectares in TE 2006-07 to 12.80 million hectares in TE 2016-17. The percentage of cultivable area to geographical area had decreased slightly from 67.73 percent in TE 2006-07 to 67.21 percent in TE 2016-17. At the district level, there was no unique trend of either declining or increasing cultivable area. Some districts observed steep decline in cultivable area as a percentage of geographical area. For example, in Bangalore urban, cultivable area declined from 47 percent in TE 2006-07 to 35 percent in TE 2016-17 and in Bellary district cultivable area declined from 72 percent to 67 percent during the same time period. Mandya district observed an increase from 70.8 percent in TE 2006-07 to 71.5 percent in TE 2016-17 while Kodagu district observed increase in cultivable area from 49.6 percent to 50.4 percent during the above-mentioned time period.

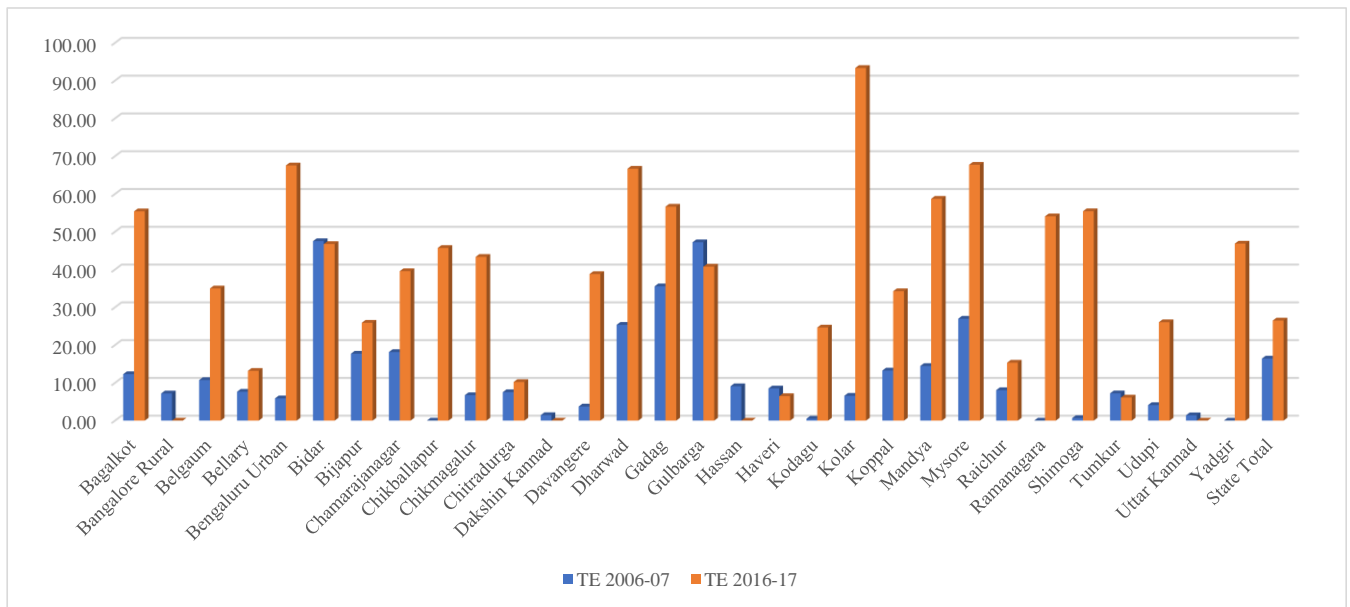


Figure 2.1: Percentage of cultivable area under pulse crops in Karnataka

Table 2.5: District wise geographical, cultivable and pulses crop area in the state (in lakh hectares)

Districts	Geographical Area	Cultivable area during		Percentage cultivable area to geographical area		Area under Pulses crops		Percentage 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
Bagalkot	6.59	5.21	5.2	79.06	78.91	0.64	2.88	12.28	55.38
Bangalore Rural	2.3	3.76	1.58	-	68.70	0.27	2.32	7.18	-
Belgaum	13.44	10.16	10.15	75.60	75.52	1.09	3.55	10.73	34.98
Bellary	8.13	5.89	5.47	72.45	67.28	0.45	0.72	7.64	13.16
Bengaluru Urban	2.17	1.02	0.77	47.00	35.48	0.06	0.52	5.88	67.53
Bidar	5.42	4.59	4.58	84.69	84.50	2.18	2.14	47.49	46.72
Bijapur	10.53	9.77	9.77	92.78	92.78	1.73	2.53	17.71	25.90
Chamarajanagar	5.7	2.26	2.25	39.65	39.47	0.41	0.89	18.14	39.56
Chikballapur	4.05	0	2.32	0.00	57.28	0	1.06	-	45.69
Chikmagalur	7.22	3.57	3.6	49.45	49.86	0.24	1.56	6.72	43.33
Chitradurga	7.71	5.32	5.29	69.00	68.61	0.4	0.54	7.52	10.21
Dakshin Kannad	4.77	2.08	2.07	43.61	43.40	0.03	2.22	1.44	-
Davangere	5.98	4.29	4.28	71.74	71.57	0.16	1.66	3.73	38.79
Dharwad	4.27	3.63	3.6	85.01	84.31	0.92	2.4	25.34	66.67
Gadag	4.66	4.08	4.08	87.55	87.55	1.45	2.31	35.54	56.62
Gulbarga	10.94	13.73	9.57	-	87.48	6.48	3.9	47.20	40.75
Hassan	6.63	4.62	4.61	69.68	69.53	0.42	5.28	9.09	114.53
Haveri	4.85	3.88	3.86	80.00	79.59	0.33	0.25	8.51	6.48
Kodagu	4.11	2.04	2.07	49.64	50.36	0.01	0.51	0.49	24.64
Kolar	3.75	4.72	2.4	-	64.00	0.31	2.24	6.57	93.33
Koppal	5.52	4.53	4.41	82.07	79.89	0.6	1.51	13.25	34.24
Mandya	4.98	3.53	3.56	70.88	71.49	0.51	2.09	14.45	58.71
Mysore	6.76	4.45	4.46	65.83	65.98	1.2	3.02	26.97	67.71
Raichur	8.36	7.57	7.57	90.55	90.55	0.61	1.16	8.06	15.32
Ramanagara	3.56	0	2.09	-	58.71	0	1.13	-	54.07
Shimoga	8.48	3.06	3.05	36.08	35.97	0.02	1.69	0.65	55.41
Tumkur	10.65	7.91	7.87	74.27	73.90	0.57	0.48	7.21	6.10
Udupi	3.56	1.95	1.92	54.78	53.93	0.08	0.5	4.10	26.04
Uttar Kannad	10.25	1.43	1.44	13.95	14.05	0.02	4.8	1.40	-
Yadgir	5.16	0	4.12	-	79.84	0	1.93	-	46.84
State Total	190.5	129.02	128.03	67.73	67.21	21.18	33.91	16.42	26.49

Source: DES, GoK

Looking at geographical, cultivable and pulse crop area at the aggregate, the share of the cultivable area to total geographical area remained almost stagnant at 67 per cent during TE 2006-07 to TE 2016-17. On the other hand, the share of area under pulses to total cultivable area increased from 16 per cent to 26 per cent during the corresponding period. Thus, over a period of

one decade, area under pulses in Karnataka increased from 21 lakh hectares to 34 lakh hectares, an increase of 13 lakh hectares. It is seen from Figures 2.1 and Table 2.5, that most of the districts also registered significant increase in share of area under pulses to cultivable area during the corresponding period. Most prominent increase occurred in Hasan, Kolar, Mysore, Mandya, Uttar Kanada, Bagalkot, Chikmagalur and Dharwad. On the other hand, a significant decline in area under pulses occurred in Gulbarga while slight decline was recorded in Haveri and Tumkur districts.

Tables 2.6a and 2.6b present area and production of major foodgrain crops and three selected pulse crops at district level in Karnataka during TE 2006-07 and TE 2016-17, respectively and Table 2.7 presents annual compound growth rate in area and production during this one decade's period. At the aggregate, both rice and coarse cereals underwent decline in area during this one-decade period. The rice area in Karnataka declined at the rate of -1.8 per cent per annum while coarse cereals area declined by -4.9 per cent per annum from TE 2006-07 to TE 2016-17. Similarly, production of rice declined by -1.3 per cent per annum and that of coarse cereals declined by miniscule -0.4 per cent per annum. Against the declining trends of area and production of rice and coarse cereals, both area as well as production of pulses observed a positive growth during the above-mentioned period. The area under pulses increased at almost 2 per cent per annum, while yield rate increased even at higher rate, consequently overall production increased by massive 4.8 per cent per annum during the decade of TE 2006-07 to TE 2016-17.

District wise, a huge increase in area under pulses was observed in Raichur, Bijapur, Bagalkot and Koppal. Area under pulses in Raichur was almost nil (only one thousand hectares) in TE 2006-07 which increased to 165 thousand hectares in TE 2016-17. Similarly, area in Bijapur increased from 173 thousand hectares to 467 thousand hectares, in Bagalkot it increased from 63 thousand to 155 thousand hectares and in Koppal area increased from 60 thousand to 119 thousand hectares within the above-mentioned decade's period. A similar increase in production of pulses was observed in these four districts. Pulses production increased from 25 to 117 thousand tonnes in Raichur, from 16 to 53 thousand tonnes in Bagalkot, from 16 to 42 thousand tonnes in Koppal and 56 thousand tonnes to 250 thousand tonnes in Bijapur during the above-mentioned period.

On the opposite, districts which had a massive negative growth rate in area and production under pulses during this period included, Haveri, Udupi, Uttara and Dakshina Kannada, Tumkur, Kolar, Chamarajanagar and urban and rural Bangalore. However, the dimension of negative growth rate in area as well as production in these districts was, by and large, less than 5 per cent per annum with the exception of Udupi, Haveri and Bangalore whereas the positive growth in the said districts was way above 5 percent per annum resulting into net growth in area as well as production positive in pulses in the state. The overall analysis of data reveals that most of the districts have been contributing in pulse production in the state. Across the districts in TE 2006-07, Gulbarga had

the highest pulses' area and production with 648 thousand hectares and 270 thousand tonnes, respectively followed by Bidar, Bijapur and Mysore, in descending order. In TE 2016-17 also Gulbarga was the highest district ranging in area and production, but far less than what it accounted for TE 2006-07 both in area as well as production. Gulbarga was followed by Bijapur, Raichur, Bidar and Mysore during TE 2016-17 in area and production of overall pulses.

It was seen in Table 2.3 that black gram, red gram and green gram together constituted 48 per cent share in area and 45 per cent share in total production of pulses in the state. We can see from Table 2.6b that out of 25.7 lakh hectares of area and 12.8 lakh tonnes of production of pulses in Karnataka, these three together constituted 12.9 lakh hectares of area and 7.4 lakh tonnes of production in TE 2016-17. The contribution of red gram alone was 8.7 lakh hectares of area and 6.4 lakh tonnes of production. In the total area under these three pulses, red gram occupied 67 per cent area and 87 per cent production while green gram occupied 27 per cent area and less than 10 per cent production with remaining 6 per cent area 4 per cent production under the black gram.

Table 2.6a: Area and production of major crops at districts level in the state (TE 2006-07)
(Area in '000 hectares, production in '000 tonnes)

District	Rice		Coarse cereals		Pulses		Black Gram		Red Gram		Green Gram	
	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod
Bagalkote	0.12	0.36	259.51	368.90	63.74	16.06	0.01	0.00	3.12	0.56	32.47	3.09
Bangalore - urban	2.97	12.35	36.63	358.00	5.87	8.17	0.02	0.01	0.81	1.32	0.02	0.01
Bangalore - rural	9.76	20.45	139.81	626.02	26.70	23.18	0.05	0.25	4.68	1.62	0.05	2.28
Belgaum	68.41	120.27	502.03	331.94	109.14	31.07	3.55	0.48	5.76	1.39	34.12	2.51
Bellary	91.85	308.33	269.07	107.16	44.55	13.32	0.14	0.05	9.63	3.57	3.88	0.15
Bidar	7.56	4.10	114.61	94.62	218.01	68.86	56.45	4.68	69.54	35.07	49.84	4.16
Bijapur	0.06	0.10	408.00	257.36	173.14	56.35	0.00	0.00	41.09	7.49	22.93	2.73
Chamarajanagar	16.85	50.48	87.34	117.66	40.75	15.49	3.45	0.83	1.86	1.03	2.55	0.78
Chickballapur	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Chikmagalur	45.39	114.06	118.15	120.14	23.59	10.51	0.80	0.11	0.75	0.35	2.03	0.39
Chitradurga	7.77	20.18	148.54	222.44	39.70	20.66	0.07	0.01	7.27	3.54	5.56	0.85
Dakshina kannada	57.41	141.82	57.41	0.00	3.05	1.30	1.95	0.73	0.00	0.91	0.70	0.19
Davanagere	120.47	429.35	343.06	612.24	16.11	7.90	0.06	0.02	5.16	3.46	2.49	0.26
Dharwad	23.77	29.72	148.60	106.12	91.63	34.99	0.76	0.17	3.01	1.26	42.49	8.38
Gadag	2.22	7.39	149.30	175.96	145.03	38.30	0.03	0.00	2.73	0.80	99.61	18.45
Gulbarga	84.93	230.16	463.98	298.35	648.36	269.8	45.74	9.21	370.3	153.5	99.81	18.50
Hassan	52.49	127.15	191.02	235.18	41.87	15.50	0.92	0.17	2.43	0.75	3.07	0.79
Haveri	36.10	69.44	244.02	399.90	32.51	10.25	0.70	0.21	3.92	1.67	17.05	4.86
Kodagu	35.72	85.27	38.98	12.60	1.11	0.51	0.00	0.00	0.02	0.01	0.00	0.00
Kolar	11.44	32.48	128.68	220.32	30.87	18.71	0.02	0.00	7.69	3.81	0.08	0.02
Koppal	70.36	249.75	233.80	136.94	60.24	16.26	0.08	0.03	11.81	2.80	17.39	5.18
Mandya	81.78	268.65	140.33	151.02	50.52	15.32	0.57	0.10	1.04	0.50	0.71	0.13
Mysore	117.39	357.57	237.78	256.04	120.19	48.44	5.76	1.48	5.07	2.51	5.48	1.60
Raichur	141.31	380.01	338.22	140.11	1	25.32	0.06	0.02	15.78	6.00	6.77	0.93
Ramanagaram	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shimoga	127.08	320.46	175.93	206.52	2.39	0.99	0.18	0.10	0.25	0.16	1.09	0.24
Tumkur	31.24	86.32	203.26	356.75	57.01	25.66	0.70	0.11	9.67	6.11	5.55	1.56
Udupi	62.49	157.21	62.52	0.04	8.25	6.81	6.48	2.61	0.00	3.67	0.16	0.04
Uttara kannada	79.53	160.22	80.87	3.85	2.34	0.88	0.66	0.30	0.06	0.16	0.72	0.20
Yadgir	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
State	1386.4	3783.6	5321.4	5916.1	2118.0	800.4	129.1	21.69	583.4	241.0	456.6	60.40
	4	6	4	7	2	8	6		9	2	1	

Source: DES, GoK

Table 2.6b: Area and production of major crops at districts level in State (TE 2016-17)
(Area in '000 hectares, production in '000 tonnes)

District	Rice		Coarse cereals		Pulses		Black Gram		Red Gram		Green Gram	
	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod
Bagalkote	0.02	0.08	186.80	325.43	155.31	53.00	0.27	0.07	15.98	10.86	28.38	4.44
Bangalore - urban	0.77	2.46	31.21	58.81	3.07	2.18	0.01	0.00	1.59	1.38	0.01	0.00
Bangalore - rural	42.49	53.78	138.00	290.73	5.37	4.71	4.53	1.14	5.51	3.25	24.20	4.66
Belgaum	80.20	287.75	247.13	474.92	143.52	62.35	0.58	0.23	5.92	3.55	8.83	1.22
Bellary	39.96	138.53	112.96	214.81	61.89	30.60	0.01	0.00	1.57	0.72	0.04	0.01
Bidar	1.38	1.57	53.17	46.23	180.11	106.01	26.53	8.62	71.68	58.80	32.55	9.09
Bijapur	0.04	0.13	232.83	319.93	466.58	249.80	0.33	0.07	237.32	160.17	7.43	1.25
Chamarajanagar	11.51	35.83	57.47	143.00	33.84	10.81	4.66	0.94	0.81	0.20	3.76	0.89
Chickballapur	1.18	3.22	105.75	186.77	16.12	8.26	0.00	0.00	8.09	3.60	0.00	0.00
Chikmagalur	34.43	90.29	79.74	126.95	26.88	16.38	0.38	0.11	0.69	0.47	3.63	1.06
Chitradurga	1.39	3.12	167.82	316.65	51.13	26.80	0.00	0.00	14.02	6.97	3.68	0.76
Dakshina kannada	46.78	126.42	0.00	0.00	2.52	0.87	1.43	0.53	0.00	0.00	0.51	0.15
Davanagere	104.27	371.99	203.48	508.49	13.87	12.08	0.25	0.10	8.79	6.96	0.30	0.08
Dharwad	22.16	16.79	80.88	108.56	111.22	34.96	1.20	0.40	1.39	0.92	36.29	7.45
Gadag	1.89	5.92	114.18	137.75	186.19	44.18	0.05	0.02	2.22	0.88	78.50	9.67
Gulbarga	5.57	14.77	231.25	255.75	564.92	460.18	22.09	9.84	321.78	282.55	31.82	13.09
Hassan	39.00	103.19	154.73	357.92	32.11	14.57	1.70	0.38	2.01	1.91	6.97	1.40
Haveri	42.38	76.08	201.48	432.67	11.45	4.63	0.18	0.05	2.16	1.35	2.54	0.76
Kodagu	29.07	76.94	3.61	18.26	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kolar	0.66	1.27	57.28	52.62	19.11	15.26	0.00	0.00	3.61	2.05	0.00	0.00
Koppal	56.19	190.25	143.76	178.23	118.71	41.70	0.71	0.32	17.24	8.20	20.85	1.21
Mandya	56.41	192.45	58.02	99.69	38.81	13.53	0.22	0.08	1.33	0.44	0.20	0.04
Mysore	88.06	286.89	80.72	184.91	98.71	45.05	13.58	4.67	2.79	1.37	9.48	2.94
Raichur	134.83	452.03	126.08	129.41	165.82	117.08	0.26	0.10	53.48	37.67	2.63	0.91
Ramanagaram	4.58	9.51	71.08	108.97	20.14	18.49	0.01	0.01	3.10	1.82	0.00	0.00
Shimoga	111.70	297.99	48.79	205.92	1.98	0.79	0.05	0.02	0.33	0.24	1.10	0.31
Tumkur	10.22	26.83	186.73	307.57	45.06	15.49	0.32	0.20	11.26	2.95	7.18	1.52
Udupi	49.00	130.81	0.01	0.05	3.91	1.80	3.40	1.61	0.00	0.00	0.23	0.06
Uttara kannada	67.08	128.20	5.25	26.31	1.60	0.53	0.35	0.16	0.01	0.01	0.51	0.09
Yadgir	73.83	211.56	55.35	54.86	125.72	60.72	0.43	0.14	72.24	42.47	32.32	7.23
State	1157.04	3336.68	3235.56	5672.18	2568.89	1275.49	83.32	29.7	866.93	641.75	343.94	70.28

Source: DES, GoK

Table 2.7: Growth rate in area and production of major crops at districts level % per annum
(TE 2006-07 to TE 2016-17)

District	Rice		Coarse cereals		Pulses		Black Gram		Red Gram		Green Gram	
	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod
Bagalkote	-16.40	-13.96	-3.23	-1.25	9.31	12.68	39.04	-	17.74	34.51	-1.34	3.69
Bangalore - urban	-12.63	-14.90	-1.59	-16.52	-6.28	-12.38	-6.70	-	6.98	0.45	-6.70	-
Bangalore - rural	15.85	10.15	-0.13	-7.38	-14.82	-14.73	56.93	16.38	1.65	7.21	85.56	7.41
Belgaum	1.60	9.12	-6.84	3.65	2.78	7.21	-16.57	-7.09	0.27	9.83	-12.64	-6.96
Bellary	-7.99	-7.69	-8.31	7.20	3.34	8.67	-23.20	-	-16.59	-14.79	-36.71	-23.72
Bidar	-15.64	-9.15	-7.39	-6.91	-1.89	4.41	-7.27	6.30	0.30	5.30	-4.17	8.13
Bijapur	-3.97	2.66	-5.46	2.20	10.42	16.06	-	-	19.17	35.83	-10.66	-7.51
Chamarajanagar	-3.74	-3.37	-4.10	1.97	-1.84	-3.53	3.05	1.25	-7.98	-15.12	3.96	1.33
Chickballapur	-	-	-	-	-	-	-	-	-	-	-	-
Chikmagalur	-2.73	-2.31	-3.86	0.55	1.31	4.54	-7.17	0.00	-0.83	2.99	5.98	10.52
Chitradurga	-15.81	-17.03	1.23	3.59	2.56	2.64	-	-	6.79	7.01	-4.04	-1.11
Dakshina kannada	-2.03	-1.14	-	-	-1.89	-3.94	-3.05	-3.15	-	-	-3.12	-2.34
Davanagere	-1.43	-1.42	-5.09	-1.84	-1.49	4.34	15.34	17.46	5.47	7.24	-19.07	-11.12
Dharwad	-0.70	-5.55	-5.90	0.23	1.96	-0.01	4.67	8.93	-7.44	-3.10	-1.56	-1.17
Gadag	-1.60	-2.19	-2.65	-2.42	2.53	1.44	5.24	-	-2.05	0.96	-2.35	-6.26
Gulbarga	-23.85	-24.01	-6.73	-1.53	-1.37	5.48	-7.02	0.66	-1.39	6.29	-10.80	-3.40
Hassan	-2.93	-2.07	-2.08	4.29	-2.62	-0.62	6.33	8.38	-1.88	9.80	8.54	5.89
Haveri	1.62	0.92	-1.90	0.79	-9.91	-7.64	-12.70	-13.37	-5.79	-2.10	-17.34	-16.94
Kodagu	-2.04	-1.02	-21.17	3.78	-37.56	-	-	-	-	-	-	-
Kolar	-24.82	-27.69	-7.77	-13.34	-4.68	-2.02	-	-	-7.28	-6.01	-	-
Koppal	-2.22	-2.68	-4.75	2.67	7.02	9.88	24.40	26.71	3.86	11.34	1.83	-13.53
Mandya	-3.65	-3.28	-8.45	-4.07	-2.60	-1.23	-9.08	-2.21	2.49	-1.27	-11.90	-11.12
Mysore	-2.83	-2.18	-10.24	-3.20	-1.95	-0.72	8.96	12.18	-5.80	-5.88	5.63	6.27
Raichur	-0.47	1.75	-9.40	-0.79	66.71	16.55	15.79	17.46	12.98	20.17	-9.02	-0.22
Ramanagaram	-	-	-	-	-	-	-	-	-	-	-	-
Shimoga	-1.28	-0.72	-12.04	-0.03	-1.86	-2.23	-12.02	-14.87	2.82	4.14	0.09	2.59
Tumkur	-10.57	-11.03	-0.84	-1.47	-2.32	-4.92	-7.53	6.16	1.53	-7.02	2.61	-0.26
Udupi	-2.40	-1.82	-58.27	2.26	-7.19	-12.46	-6.25	-4.72	-	-	3.70	4.14
Uttara kannada	-1.69	-2.20	-23.93	21.19	-3.73	-4.94	-6.15	-6.09	-16.40	-24.21	-3.39	-7.67
Yadgir	-	-	-	-	-	-	-	-	-	-	-	-
State	-1.79	-1.25	-4.85	-0.42	1.95	4.77	-4.29	3.21	4.04	10.29	-2.79	1.53

Source: DES, GoK

Looking at the growth pattern of these three pulse crops from TE 2006-07 to TE 2016-17, black gram and green gram saw a negative trend in area by -4.3 per cent per annum and -2.8 per cent per annum, respectively. Their production, however, grew by positive 3.2 per cent and 1.5 per cent per annum, respectively during the above-mentioned period. Red gram, on the other hand, has undergone a massive climb in area (4 per cent per annum) and production (10.3 per cent per annum). In nutshell, we can conclude that the rise in area and production of pulses in Karnataka was primarily contributed by the red gram. In TE 2016-17, the districts which occupied prime position in black gram area and production were in the descending order of Bidar, Gulbarga and Mysore. Gulbarga dominated in red gram, followed by Bijapur, Yadgir, Bidar, Raichur and Koppal. Green gram was mainly grown in Gadag, Dharwad, Gulbarga, Bidar, and Yadgir districts.

During the decade of TE 2006-07 to TE 2016-17, districts namely Koppal, Davangere, Raichur, Mysore and Hassan observed high positive growth rate in area and production of black gram. Similarly, Bijapur, Bagalkot, Raichur, Chitradurga and Davangere observed highly positive growth in area and production of red gram. In the case of green gram, high positive growth in area and production was observed in Chikamagalur, Hassan, Mysore and Udupi. On the opposite, negative growth in area and production was seen in Belgaum, Haveri, Shimoga, Udupi and Uttar Kannada in black gram during this period. In red gram, negative growth in area and production was seen in Bellary, Chamrajnagar, Dharwad, Kollar, Mysore and Uttar Kannada during the above mentioned period. In green gram negative growth was observed in Bellary, Bijapur, Belgaum, Davangere, Gulbarga, Haveri, Mandya and Uttar Kannada during the same time period.

2.4 District wise distribution of seed minikit in Karnataka

The district-wise distribution of seed minikits in Karnataka is presented in Table 2.8a and 2.8b and their yearwise distribution is presented in Appendix Table 2.1A. It can be seen from these tables that out of around 1.5 lakh total seed minikits distributed for pulses in Karnataka, around 57 per cent alone were distributed for the red gram which is one of the most important pulse crops grown in Karnataka. Red gram was followed by black gram and green gram with a share of around 19.6 and 18.6 per cent, respectively. The remaining pulses shared only rest of the around 5 per cent share of seed minikits distributed in the state. Thus, given the fact that mainly three pulse crop minikits viz., red gram, black gram and green gram were distributed to the farmers under this scheme, we selected these three crops for this study for carrying out the primary survey.

Looking at the distribution of seed minikits of pulse crops together for the three years (from 2017 to 2019) in different districts in the state, the highest number of minikits were distributed in Gulbarga district (14.4 per cent of total minikits) followed by Bijapur district (9.8 per cent), Bidar (8.3 per cent), Yadgir (6.8 per cent), Raichur (5.7 per cent), Tumkur (5.3 per cent), Chitradurga (4.8 per cent), Chamarajnanagar (3.9 per cent), Belgaum (3.8 per cent) and Mysore (3.7 per cent). These ten districts together accounted for almost 2/3rd of the total seed minikits distributed in the state. Based on different agro climatic regions, we selected Mysore as irrigated district and Tumkur as dryland district for the primary survey for this study. A total number of 342 farmers consisting of 231 beneficiary households and 111 non beneficiary households were selected based on the list of beneficiaries provided by the officials of the agriculture department in the concerned districts. More detailed analysis of selection of farmers is provided in the next chapter.

Table 2.8a: District wise distribution of seed minikit in the state (numbers)

Name of the state	Red gram	Black gram	Green gram	Other pulses	Sum total	Red gram	Black gram	Green gram	Other pulses	Sum total
	Total numbers of minikits distributed					Percentage of total minikits				
Bagalkote	2650	0	2200	500	5350	49.5	0.0	41.1	9.3	100.0
Bangalore - urban	2000	225	25	0	2250	88.9	10.0	1.1	0.0	100.0
Bangalore - rural	2400	50	125	50	2625	91.4	1.9	4.8	1.9	100.0
Belgaum	1100	1700	2200	500	5500	20.0	30.9	40.0	9.1	100.0
Bellary	3000	175	250	500	3925	76.4	4.5	6.4	12.7	100.0
Bidar	4700	5050	1900	550	12200	38.5	41.4	15.6	4.5	100.0
Bijapur	10500	1200	1900	700	14300	73.4	8.4	13.3	4.9	100.0
Chamarajanagar	2200	2825	650	0	5675	38.8	49.8	11.5	0.0	100.0
Chickballapur	5000	0	0	50	5050	99.0	0.0	0.0	1.0	100.0
Chikmagalur	0	1350	650	150	2150	0.0	62.8	30.2	7.0	100.0
Chitradurga	5800	225	650	350	7025	82.6	3.2	9.3	5.0	100.0
Dakshina Kannada	0	0	100	0	100	0.0	0.0	100.0	0.0	100.0
Davanagere	1000	375	450	100	1925	51.9	19.5	23.4	5.2	100.0
Dharwad	450	1200	2475	600	4725	9.5	25.4	52.4	12.7	100.0
Gadag	400	0	2400	600	3400	11.8	0.0	70.6	17.6	100.0
Gulbarga	11800	6050	2400	750	21000	56.2	28.8	11.4	3.6	100.0
Hassan	400	1400	1150	200	3150	12.7	44.4	36.5	6.3	100.0
Haveri	350	225	300	0	875	40.0	25.7	34.3	0.0	100.0
Kodagu	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Kolar	4100	0	0	50	4150	98.8	0.0	0.0	1.2	100.0
Koppal	1700	525	1900	400	4525	37.6	11.6	42.0	8.8	100.0
Mandya	1200	525	400	100	2225	53.9	23.6	18.0	4.5	100.0
Mysore	2000	2400	800	200	5400	37.0	44.4	14.8	3.7	100.0
Raichur	7450	0	450	400	8300	89.8	0.0	5.4	4.8	100.0
Ramanagaram	2000	0	50	100	2150	93.0	0.0	2.3	4.7	100.0
Shimoga	0	50	275	0	325	0.0	15.4	84.6	0.0	100.0
Tumkur	4750	1350	1600	100	7800	60.9	17.3	20.5	1.3	100.0
Udupi	0	0	50	0	50	0.0	0.0	100.0	0.0	100.0
Uttara kannada	0	0	50	0	50	0.0	0.0	100.0	0.0	100.0
Yadgir	6050	1750	1850	300	9950	60.8	17.6	18.6	3.0	100.0
State total	83000	28650	27250	7250	146150	56.8	19.6	18.6	5.0	100.0

Source: Department of Agriculture, GoK

Table 2.8b: District wise distribution of seed minikit in the state (percentage)

Name of the state	Redgram	Blackgram	Green gram	Others	Sum total
Gulbarga	14.2	21.1	8.8	10.3	14.4
Bijapur	12.7	4.2	7.0	9.7	9.8
Bidar	5.7	17.6	7.0	7.6	8.3
Yadgir	7.3	6.1	6.8	4.1	6.8
Raichur	9.0	0.0	1.7	5.5	5.7
Tumkur	5.7	4.7	5.9	1.4	5.3
Chitradurga	7.0	0.8	2.4	4.8	4.8
Chamarajanagar	2.7	9.9	2.4	0.0	3.9
Belgaum	1.3	5.9	8.1	6.9	3.8
Mysore	2.4	8.4	2.9	2.8	3.7
Bagalkote	3.2	0.0	8.1	6.9	3.7
Chickballapur	6.0	0.0	0.0	0.7	3.5
Dharwad	0.5	4.2	9.1	8.3	3.2
Koppal	2.0	1.8	7.0	5.5	3.1
Kolar	4.9	0.0	0.0	0.7	2.8
Bellary	3.6	0.6	0.9	6.9	2.7
Gadag	0.5	0.0	8.8	8.3	2.3
Hassan	0.5	4.9	4.2	2.8	2.2
Bangalore - rural	2.9	0.2	0.5	0.7	1.8
Bangalore - urban	2.4	0.8	0.1	0.0	1.5
Mandya	1.4	1.8	1.5	1.4	1.5
Chikmagalur	0.0	4.7	2.4	2.1	1.5
Ramanagaram	2.4	0.0	0.2	1.4	1.5
Davanagere	1.2	1.3	1.7	1.4	1.3
Haveri	0.4	0.8	1.1	0.0	0.6
Shimoga	0.0	0.2	1.0	0.0	0.2
Dakshina Kannada	0.0	0.0	0.4	0.0	0.1
Udupi	0.0	0.0	0.2	0.0	0.0
Uttara kannada	0.0	0.0	0.2	0.0	0.0
Kodagu	0.0	0.0	0.0	0.0	0.0
State total	100.0	100.0	100.0	100.0	100.0

Source: Department of Agriculture, GoK

2.5 Summary of the chapter

In Karnataka, the pulses constituted around 11.6 per cent area in India and around 8 per cent share of production in 2018-19. Pulses production in Karnataka increased from around 8 lakh tones in TE 1990-91 to 18.6 lakh tonnes in 2018-19. In Karnataka, the share of pulses to gross cropped area was around 20 per cent during the early 1990s which increased to near 25 per cent in 2018-19. Among the three selected pulse crops, there was perceptible increase in area and production only in red gram (tur) as compared to black gram (urad) and green gram (moong).

Out of around 1.5 lakh seed minikits distributed for pulses in Karnataka, around 57 per cent alone were distributed for the red gram which is one of the most important pulse

crops grown in Karnataka. Red gram was followed by black gram and green gram with a share of around 19.6 and 18.6 per cent, respectively. The remaining pulses shared only rest of the around 5 per cent share of seed minikits distributed in the state. Thus, given the fact that mainly three pulse crop minikits viz., red gram, black gram and green gram were distributed to the farmers under this scheme, we selected these three crops for this study for carrying out the primary survey.

Chapter - III

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

3.1 Introduction

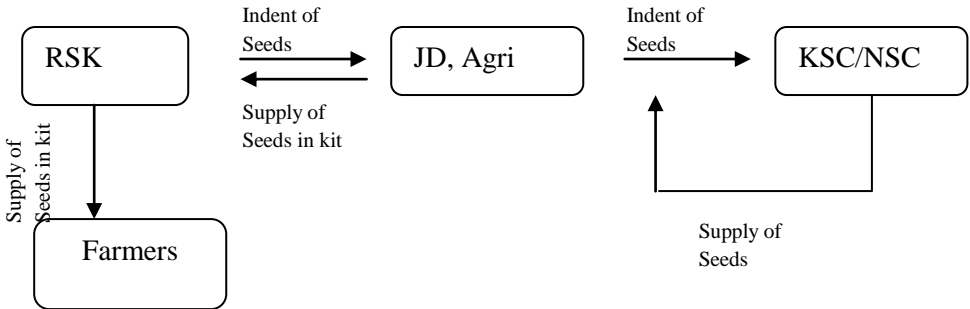
In the last chapter, we discussed cropping pattern in Karnataka whereby it was seen that there was general trend of diversification in cropping pattern and area shift was taking place from cereals and oilseeds towards horticultural crops. Whereas diversification was happening from food grains to non-food grain crops, rice was able to maintain its area share while pulses were the only food grain crops which had substantial increase in their area. The share of pulses to gross cropped area in Karnataka increased from around 20 per cent during the early 1990s to above 25 per cent in the decade ending 2020s. As mentioned in the last chapter, the rise in area under pulses was the outcome of several pulses promotion programmes like ISOPOM, National Food security Mission, Rashtriya Krishi Vikas Yojana and so on.

This study is evaluating one such programme for pulse crop promotion, namely Seed Minikits Programme in Pulses. As has been described in chapter one, the latest varieties not older than 10 years are popularized through distribution of seed minikits free of cost to the farmers. The purpose is to ensure, that the identified farmer is capable of raising the crop with care and diligence such that the plot serves as a good demonstration to other farmers. This study looks into various aspects of implementation of this programme like how efficiently the distribution of seeds is taking place; to what extent scheme is relevant and useful from the viewpoint of farmers; and whether seed minikits have any significant impact on productivity. The present study examines the need, application, pertinence and efficiency in distribution of seed minikits.

Regarding the primary field survey, two districts were selected, one irrigated and one dryland based on the available list of households with highest seed minikits distributed in the district during the reference period of 2017-18 and 2018-19. Based on the above criterion, we selected Mysore as an irrigated district with highest numbers of seed minikits distributed for pulses. For dryland district, Tumkur was selected although not the district with highest numbers of seed minikits distribution but one of the high numbers and the district with the readily available list of beneficiary farmers of seed minikits during the reference period. As per the design of the study, among the selected districts, a sample of 100 seed minikits beneficiary farmers and 50 control group pulse growing farmers are to be selected using

random sampling method. In actual we selected slight more numbers in order to have sufficient beneficiary and control farmers in each selected districts as well as at the aggregate. A total number of 231 beneficiaries and 111 non beneficiaries were selected from Mysore and Tumkur districts in Karnataka making the total number of selected farmers up to 342.

In order to select households, the seed minikits distribution list was collected for the year 2017-18 and 2018-19. While selecting the households, the sample was included for both these years. We avoided those farmers who received seed minikits distributed in the year 2019-20 as at the time of survey it would not be feasible to check the replication and reproductive use of seed minikits received during 2019-20. During the field survey, we collected information on area sown, productivity and resources used for seed minikits pulse crops as well as the reproduced seed pulse crops. In order to capture authentic data, efforts were made to interview the heads of households. The reference period of survey data was 2018-19, i.e., Kharif (July-Nov 2018), Rabi (Nov 2018 to March 2019) and Summer (March-June 2019). Outline 3.1 provides comprehensive details of flow of application form from farmers to the authorities and the seed minikits supplied by the authorities to the farmers through RSK (Raitha Samparka Kendra), Joint Director Agriculture and the concerned seed companies.



Outline 3.1: Channelizing seed minikit in Karnataka

Table 3.1a provides details of the selected sample in the two districts namely, Mysore and Tumkur and Table 3.1b provides details of the sample by farm size holdings. It is seen from these tables that beneficiary households constituted 67.5 per cent of the sample while control group constituted that of 32.5 per cent. Across various size of holdings, marginal and small farmers constituted 34 and 45 per cent of the sample, respectively while medium and large farmers constituted 19 and 3 per cent, respectively. It is notable here that the seed minikits scheme is basically meant for SC/ST, women and small and marginal farmers.

Among the beneficiaries, small and marginal farmers constituted a share of 31 and 45 per cent, respectively while medium and large farmers had 24 per cent share in the sample.

Table 3.1a: Number of households selected District wise

Name of the district	Beneficiaries	Non beneficiaries	Sum total	Beneficiaries	Non beneficiaries	Sum total
	Number of households			Percentage of sum total		
Mysore	109	57	166	65.7	34.3	100.0
Tumkur	122	54	176	69.3	30.7	100.0
Total	231	111	342	67.5	32.5	100.0

Table 3.1b: Numbers of households selected by farm size categories

Household Selected	Marginal	Small	Medium	Large	Total
Beneficiaries	72 (31.2)	103 (44.6)	49 (21.2)	7 (3.0)	231 (100.0)
Non beneficiaries	43 (38.7)	50 (45.0)	16 (14.4)	2 (1.8)	111 (100.0)
Total	115 (33.6)	153 (44.7)	65 (19.0)	9 (2.6)	342 (100.0)

For the analysis, sample farmers are grouped as marginal, small, medium and large farmers. Net operational area was taken as basis for this classification. The sample farmers whose net operational holding was equal to or less than 2.5 acres were categorised as marginal farmers. The net operated holdings of small farmers ranged between 2.51 to 5 acres. The sample farmers with net operational holdings above 5.0 acres and less than or equal to 10.0 acres were grouped as medium farmers. Rest of all the sample farmers having operational holdings above 10 acres were classified as large farmers. For analysis in this chapter all selected households, viz., beneficiary and non beneficiary farmers have been clubbed together to present socio economic characteristics as well as cropping pattern and value of output and earnings of the selected households.

3.2 Socio-economic characteristics of the selected farmers

The socio economic details of the selected households are presented in Table 3.2. The average family size of the household was 2.63 members per household. It ranged between 2.28 members per family in the case of marginal farmers and 3.02 members per family in case of medium farmers. At the aggregate, sample farmers had around 29 years of farming experience and around 2.3 members of the family were engaged in farming activities. As high as 93 per cent of the heads of the sample were male and only 7 per cent were female. The proportion of female as head was much higher among large farmers compared to small farmers. On average, above 70 per cent of the respondents were in the age group of 30-60

years and more than 20 per cent were above 60 years. Small farmers had comparatively younger person as head or respondent compared to large and medium farmers. Among the selected households, around 20 per cent of the respondents were illiterate while around 55 per cent were matriculate or below. Only around 6 per cent were graduates and 5 per cent were post-graduates. Thus, the lower level of education also reveals poor economic condition of the sample households. The number of graduates and post graduates was abysmally low (less than 5 per cent) among marginal farmers.

Table 3.2: Demographic profile of the selected farmers (% of households)

Details about the households		Marginal	Small	Medium	Large	Total
No. of Households		115	153	65	9	342
Average size of HH		2.28	2.73	3.02	2.44	2.63
Gender of Respondent (%)	Male	92.17	94.12	93.85	88.89	93.27
	Female	7.83	5.88	6.15	11.11	6.73
Age of the Respondent (%)	<30	6.08	5.88	6.15	0.00	5.84
	30-60	67.82	71.24	78.46	66.66	71.34
	>60	26.08	22.87	15.38	33.33	22.80
Education status of Respondent, number of years of education (%)	Illiterate	22.61	21.57	12.31	11.11	19.88
	Up to Primary (5)	23.48	9.80	13.85	11.11	15.20
	Up to Middle (8)	12.17	16.34	15.38	11.11	14.62
	Up to Matric (10)	26.96	29.41	21.54	22.22	26.90
	Up to + 2	10.43	13.07	20.00	0.00	13.16
	Above graduate	0.87	5.88	12.31	11.11	5.56
Average members of family doing farming		2.28	2.73	3.02	2.44	2.28
Average years of farming experience		29.98	28.39	29.22	30.56	29.14
Caste (% of households)	SC	16.52	17.65	6.15	11.11	14.91
	ST	7.83	10.46	6.15	0	8.48
	OBC	24.35	16.99	20	11.11	19.88
	General	51.3	54.9	67.69	77.78	56.73
Main occupation of respondent (%)	Agriculture and allied	99.13	100.00	100	100.00	99.71
	Agricultural labour	0.87	0.00	0	0	0.29
	Non-agricultural labour	0.00	0.00	0.00	0.00	0.00
	Self-business / services	0.00	0.00	0.00	0.00	0.00
	Salaried/pensioners	0.00	0.00	0.00	0.00	0.00
	Others	0.00	0.00	0.00	0.00	0.00
Subsidiary occupation of respondent (%)	Agriculture and allied	8	5.88	22.22	25	9.72
	Agricultural labour	36	29.41	0	0	26.39
	Non-agricultural labour	28	20.59	11.11	0	20.83
	Self business / services	28	29.41	44.44	50	29.16
	Salaried/pensioners	0	11.76	11.11	0	9.72
	Others	0	2.94	11.11	25	4.17
Average Annual Income	Agriculture and allied	56659	100784	157431	637111	110827
	Non-agricultural Sources	43107	46330	42800	88600	46836
	Sum total	99766	147114	200231	725711	157663

The sample had representation of General category (57 per cent), OBC (20 per cent), Scheduled castes (15 per cent) and Scheduled Tribes (8 per cent). Although the seed minikits scheme was targeted towards SC and ST farmers, the majority of sample belonged to the general category households. This indicates that either there was misappropriation of the programme by general category households or the allocation of seed minikits by authorities was not implemented as per the basic objective of the scheme. Analysis of occupation of head of the households indicated that almost all households were engaged in agriculture and allied activities as their main occupation. Only less than one per cent were engaged in agriculture labour activities. Among the subsidiary occupations of the household, agriculture and non agricultural labour dominated subsidiary earnings by the household members while self business and salaries were the other main activities. Last but not the least, the annual income of the selected households on average was measured at Rs 1.5 lakh which varied from less than Rs 1 lakh for the marginal farmers, Rs 2 lakh for medium farmers and above Rs 7 lakh for the large farmers. The share of agriculture in total income was 70 per cent at the aggregate and it was almost 88 per cent among large farmers, less than 80 per cent among medium farmers while it was only 68.5 per cent for small farmers and only 57 per cent in the case of marginal farmers. Thus, small and marginal farmers depended much on the subsidiary occupation for their livelihood as compared to medium and large farmers.

3.3 Characteristics of operational holdings:

The details of operational holdings of sample farmers are presented in Table 3.3. It can be observed from the table that leasing-in or leasing-out of land was minimal in study area. Less than an acre of leasing activities was indicated mainly by medium and large farmers. Non-cultivable area constituted less than 1 per cent of the total owned area. Thus, owned and cultivated area was almost same. On average, the net operated area per household of the selected sample was 4.14 acres. Although our sample included one district of dryland area, whereas the holding size generally is large in dryland area but because of majority of the beneficiary households belonging to smaller piece of land, our average holding size was only around 4 acres per household. The average size of operational holding of marginal farmers was less than 2 acres per household, that of small farmers less than 4 acres, medium farmers 7 acres while large farmers operated around 17 acres. The number of large and medium farmer in the sample was around 20 per cent only. Thus, predominance of small and marginal farmers in the sample is implicit from their operational area. Figure 3.1 clearly spells out unequal distribution of holdings and area operated. It is seen from the figure that marginal

farmers constituted 33 per cent holdings and only 6 per cent of total operated area in the sample. The small farmers constituted lion's share of 45 per cent holdings and only 13 per cent area. Medium farmers' share in numbers of holdings was around 19 per cent and they operated 23 per cent area. The dominance of large farmers is apparent from the fact that they constituted only 3 per cent holdings but occupied as high as 58 per cent of operational area.

Table 3.3: Characteristics of operational holdings (acres per household)

Farm size	Owned land	Non cultivable	Leased-in	Leased - out	Average Rental (Rs/acre)	NOA	Net Irrigated area	GCA	Cropping intensity
	1	2	3	4	5	6	7		8
Marginal	1.95	0.03	0	0.03	10857	1.89	0.56	2.84	150.65
Small	3.75	0.01	0.09	0.02	5471	3.81	1.44	4.97	130.29
Medium	7.09	0.12	0.12	0.02	3471	7.07	2.84	8.30	117.34
Large	16.83	0.00	0.56	0.00	2400	17.38	10.13	18.22	104.80
Total	4.12	0.04	0.08	0.02	5074	4.14	1.64	5.23	126.39

Note: NOA: Net Operated Area; GCA: Gross Cropped Area

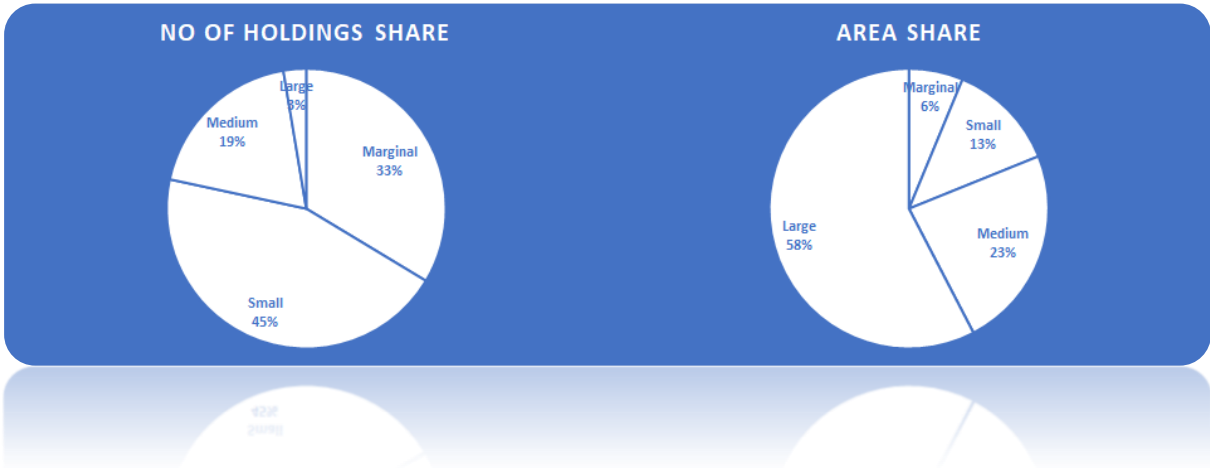


Figure-3.1: Size-group-wise number of sample farmers and their net operated area

The cropping intensity among the large farmers was only one crop per annum (1.05 crops per annum) while medium farmers cropping intensity was slightly higher 1.2 crops per annum. Small and marginal farmers were growing around 1.3 to 1.5 crops per acre per annum. To sum up, small and marginal farmers were making more efforts to grow more crops in their given smaller holdings compared to medium and large farmers. The substantially low cropping intensity among the sample farmers was because of predominance of dryland nature of the agriculture in which there was preponderance of pulse crops in the cropping pattern. The dryland nature is also visible from the net irrigated area of the sample households. Out of total operated area by our sample households, only 40 per cent area was irrigated and it varied from 30 per cent in the case of marginal farmers to 58 per cent in the case of large farmers.

3.4 Sources of irrigation

Almost 60 percent of the net operated area among the sample households was under rainfed conditions. The rest of 40 percent was irrigated mainly by bore wells with 29 percent followed by canal (10 per cent). The area irrigated by the dug wells, tanks and others was mostly negligible. The details of irrigation by source and by farm size holdings are presented in Table 3.4 and Figure 3.2 below.

Table 3.4: Source of irrigation of net operated area (%)

Farm size	Only canal	Bore well	Dug well	Tank	Others	Rain fed area	Actual Water Charges (Rs/acre)	Total operated area
	1	2	3	4	5	6		
Marginal	9.57	18.29	1.15	0.00	0.58	70.41	949	100
Small	10.03	27.03	0.51	0.26	0.00	62.18	1332	100
Medium	9.19	30.96	0.00	0.00	0.00	59.85	170	100
Large	16.30	41.99	0.00	0.00	0.00	41.71	84	100
Total	10.38	28.62	0.39	0.11	0.09	60.42	698	100

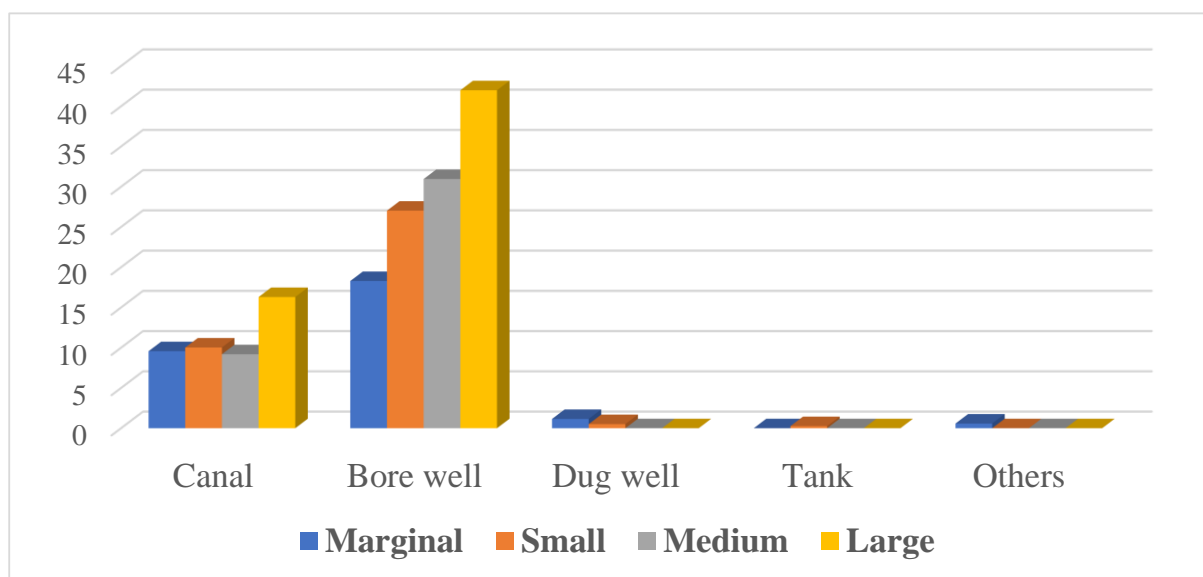


Figure-3.2: Sources of irrigation in the study area

It is clearly visible from the statistics in the table that more than 60 per cent area operated by marginal and small farmers was un-irrigated whereas in the case of large farmers only 42 per cent area was un-irrigated. Marginal and small farmers had relatively less proportion of area under bore well and more area under canal whereas it was the reverse case among medium and large farmers. The large farmers had 42 per cent area irrigated by bore well whereas only 18 per cent area of the marginal farmers was irrigated by bore wells. On the other hand, around 10 per cent area was irrigated by canal in the case of marginal, small and medium

farmers while large farmers had around 16 per cent area irrigated by canal. Proportion of area irrigated by tanks and other sources was almost negligible across all size of holdings.

3.5 Cropping pattern among the selected households

Table 3.5 reveals the cropping pattern of the study area during the reference year. The gross cropped area of the selected farmers aggregated at 1790 acres which was spread among marginal, small, medium and large farmers by 18, 42, 30 and 9 per cent, respectively. Among the pulse crops, selected farmers grew mainly red gram, green gram and black gram both in irrigated as well as rainfed conditions in the kharif and rabi seasons. As these pulse crops are legumes, after the harvest farmers ploughed over it and left for mulching for the subsequent crop/season in the irrigated fields. Ragi and paddy were the major staple crops cultivated by the selected farmers. In the rainfed areas, staples like paddy and ragi were grown in addition to pulse crops as mentioned above (green gram, red gram and black gram) and other pulses like cow pea, horse gram, field beans etc.

Table 3.5: Cropping pattern of selected farmers during the reference year 2018-19
(% of GCA)

Name of the crop	Marginal	Small	Medium	Large	Total
Irrigated crops					
Redgram	2.50	1.86	1.70	2.13	1.95
Greengram	2.83	2.19	0.37	1.52	1.69
Blackgram	3.93	2.88	1.10	0.61	2.32
Paddy	6.56	6.33	6.44	7.93	6.55
Commercial crops	1.72	1.58	2.76	1.83	1.99
Other Pulses	2.62	3.63	1.98	2.44	2.84
Ragi	2.77	4.35	1.80	4.27	3.29
Others	2.08	5.39	6.10	11.59	5.57
Rainfed crops					
Ragi	19.13	20.75	19.79	18.91	20.00
Other cereals	2.23	2.58	3.96	3.05	2.98
Redgram	11.36	9.26	7.31	1.22	8.31
Greengram	12.35	8.29	8.17	1.83	8.40
Blackgram	6.18	6.16	6.84	2.90	6.07
Other Pulses	12.25	7.68	7.77	2.74	8.09
Others	0.08	0.20	0.28	3.66	0.52
Commercial crops	5.42	4.22	4.32	10.37	5.03
Oilseeds	1.77	0.89	0.64	0.00	0.89
Perennial crops					
Coconut	3.83	10.04	17.43	22.99	12.34
Arecanut	0.37	1.71	1.24	0.00	1.17
Gross cropped area	100.00	100.00	100.00	100.00	100.00
Gross cropped area (acres)	324.66	758.5	543.45	163.95	1790.58

Figure 3.3 presents percentage of gross cropped area under different crops by the selected farmers. At the aggregate, pulses occupied around 40 per cent of the total cropped

area with proportion of around 10 per cent each by red gram, green gram and black gram and additional 10 per cent area occupied by other pulses like cowpeas, horse gram and field beans. Pulses area was followed by cereals including paddy and ragi by 33 per cent, and perennials 14 per cent. The perennial crops included coconut and arecanut, the two crops being major plantation crops grown in the study area of Tumkur districts, as the district is called the land of coconut trees (kalpatharu Nadu). The small and medium farmers are major cultivators of the above mentioned perennial crops in the study area. Usually short duration crops like pluses are grown along with perennial crops.

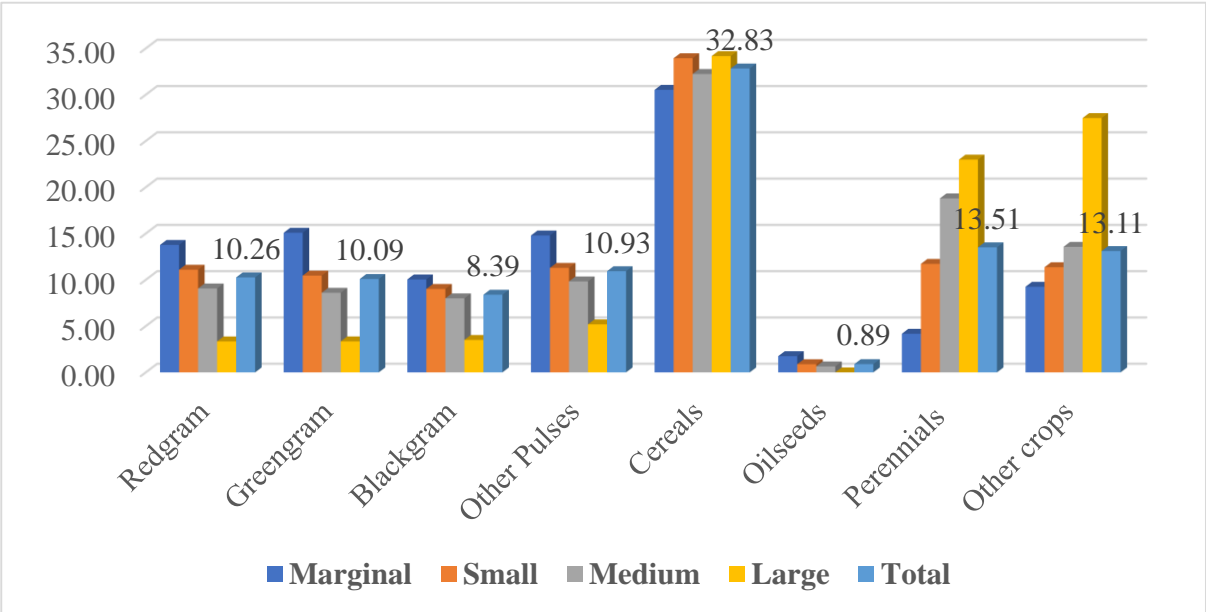


Figure-3.3: Area under pulses and other crops as % of GCA

In addition to above mentioned crops, around 13 per cent area at the aggregate was covered by other crops which included oilseeds and other commercial crops. Proportion of these other crops was above 25 per cent among large farmers compared to less than or equal to 10 percent of the gross cropped area among marginal and small farmers. Against the trends of commercial and plantation crops whereby large farmers devoted proportionately more area under these crops, in the case of pulses proportionately higher area was devoted to these crops by small and marginal farmers compared to large farmers. For this reason, pulses are also known to be the crop of marginal lands (dryland) and marginal holdings with low returns compared to commercial and other cash crops.

3.6 Production, cost and returns by farm size

The statistics relating to value of output per household and per acre, cost of production and net returns are provided in Table 3.6. It is evident from the data that net farm income from

cultivated area per household was directly related to the holding size. On average, the net earnings per household was Rs 77 thousand per annum and its range was noted as Rs 32 thousand for marginal farmers, Rs 69 thousand for small farmers, Rs 1.36 lakh for medium farmers and Rs 3.6 lakh for the large farmers. The value of output was much higher for large farmers on account of cultivating higher area compared to small and marginal farmers. Comparison of net returns per acre corrects the scale biasness and gives more fairer comparison of productivity across holding size.

Table 3.6: Value of output, cost and net returns for the reference year – aggregate of all crops

Farm Size	Production (Rs/acre)		Value of output (main + by-product) (Rs/acre)	Cost of production (Rs/acre)		Net returns (Farm business income) (Rs/acre)	Net Farm income from cultivated area (Rs) per hh
	Irrigated	Rainfed		Material cost	Labour cost		
Marginal	53990	20814	32639	9895	5976	16769	31611
Small	55691	18119	34203	10183	5811	18209	69441
Medium	57983	16184	34022	9362	5456	19205	135833
Large	48994	18456	37245	10780	6015	20450	355462
Total	55159	18004	34240	9938	5743	18559	76866

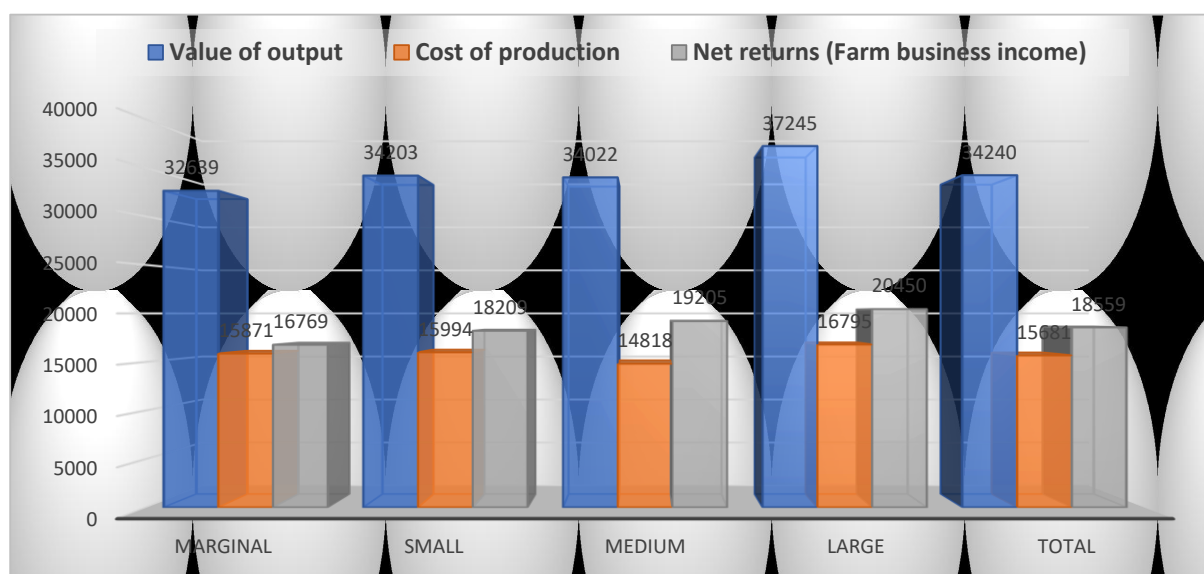


Figure-3.4: Cost and returns per acre of net operated of sample households

Per acre output was much evenly distributed across small and large farmers. Its value was highest Rs 37 thousand per acre in the case of large farmers, Rs 34 thousand for medium and small farmers and Rs 33 thousand for the marginal farmers (Figure 3.4). At the aggregate, value of productivity per acre was Rs 34 thousand. The value of output, cost and returns are calculated by adding up all the crops together and therefore value of output minus cost represents net farm business income (FBI). The cost of production per acre although did not show any particular trend but it was highest for large farmers and lowest for the medium

farmers. The net returns from agriculture (FBI) showed an inverse trend with large farmers having not only highest returns per household but also per acre. At the aggregate farm business income per acre averaged at Rs 18.5 thousand that varied from Rs 16.8 thousand in the case of marginal farmers, Rs 18 thousand for small farmers, Rs 19 thousand for medium farmers and Rs 20 thousand for large farmers. Thus, although per acre returns were much equitable, but the gross income of large farmers was much higher compared to small and marginal farmers on account of cultivating much larger area. This difference in farm business income may be corrected to some extent by the activities in the allied sectors and that of nonfarm activities which generally favour the smaller size holdings.

3.7 Summary of the chapter

Among the selected sample, beneficiary households constituted 67.5 per cent of the sample while control group constituted that of 32.5 per cent. The average family size of the household was 2.63 members per household. Sample farmers had around 29 years of farming experience and around 2.3 members of the family were engaged in farming activities. Among the selected households, around 20 per cent of the respondents were illiterate while around 55 per cent were matriculate or below. Only around 6 per cent were graduates and 5 per cent were post-graduates. The sample had representation of General category (57 per cent), OBC (20 per cent), Scheduled castes (15 per cent) and Scheduled Tribes (8 per cent). Although the seed minikits scheme was targeted towards SC and ST farmers, the majority of sample belonged to the general category households. This indicates that either there was misappropriation of the programme by general category households or the allocation of seed minikits by authorities was not implemented as per the basic objective of the scheme.

On average, the net operated area per household of the selected sample was 4.14 acres. The cropping intensity was measured only 1.3. Almost 60 percent of the net operated area among the sample households was under rainfed conditions. Among the selected farmers, pulses occupied around 40 per cent of the total cropped area with proportion of around 10 per cent each by red gram, green gram and black gram and additional 10 per cent area occupied by other pulses like cowpeas, horse gram and field beans. Per acre output value was highest Rs 37 thousand per acre in the case of large farmers, Rs 34 thousand for medium and small farmers and Rs 33 thousand for the marginal farmers. The cost of production per acre although did not show any particular trend but it was highest for large farmers and lowest for the medium farmers. The net returns from agriculture (FBI) showed an inverse trend with large farmers having not only highest returns per household but also per acre. At

the aggregate farm business income per acre averaged at Rs 18.5 thousand that varied from Rs 16.8 thousand in the case of marginal farmers, Rs 18 thousand for small farmers, Rs 19 thousand for medium farmers and Rs 20 thousand for large farmers.

Chapter IV

Efficiency of Seed Minikits Distribution in Karnataka

Efficiency is one of the key determinants measuring the performance of any entity or scheme/policy. The last chapter presented socio economic characteristics of selected beneficiary and non beneficiary households along with their cropping pattern and their productivity, cost and farm earnings. This chapter analyzes the efficiency of seed minikits distribution in Karnataka with reference to the selected households in Tumkur and Mysore districts. The chapter begins with comparison of productivity of selected pulses grown by beneficiary households using seeds obtained from the seed minikits vis-à-vis same pulses grown by the control group farmers in the vicinity of the beneficiary farmers. The chapter also provides cost and returns comparison between the beneficiary and non-beneficiary farmers. To bring out the comparison the results are analysed and presented across three selected crops by farm size categories. The seed minikits were disturbed for three majorly cultivated pulse crops in the state viz., black gram, green gram and red gram. The distribution efficiency is analysed through comparison of usage and availability of kits and farmers' opinion about the timings of the distribution as well as quantity required and quantity received. Chapter also analyses various other aspects of seed minikits distribution. To improvise the effectiveness and reach of the scheme, discussion is raised with regard to the major deterrents and issues faced by farmers in availing the scheme. The chapter concludes with the suggestions how to make the scheme more effective in the allocation of such inputs to the farmers.

4.1 Economics of pulses production under SMK beneficiary and non beneficiaries

The area, production, price, cost and net returns of the beneficiary and non beneficiary farmers of pulse crops is presented in Table 4.1. As seed minikits were distributed for three pulse crops, namely red, green and black gram in Karnataka, our analysis remains confined to these pulse crops only. The last section of the table presents aggregate average details of all the three crops together. At the aggregate, area under three crops averaged at around slightly less than one acre per household among the beneficiary farmers and slightly above one acre among the control group farmers who were selected from the vicinity of the beneficiary farmers so that there is no bias in the comparison of the two categories.

Area allocated to these pulses was not much different across various farm size holdings as the range was within 1 to 1.5 acres only. The value of crop productivity per acre

was much higher for the beneficiary farmers as compared to control group. At the aggregate value of output per acre for the beneficiary farmers was Rs 16.5 thousand compared to 12.7 thousand for the control group farmers.

Table 4.1: Productivity and net returns from pulses with and without Seed-minikits

Farm Size	Area under pulses (acres/HH)		Value of Output (Rs/acre)		Cost of Production (Rs/acre)		Net Returns (Rs/acre)		Net price obtained (Rs/quintal)	
	SMK	Without	SMK	Without	SMK	Without	SMK	Without	SMK	Without
Red gram										
Marginal	0.87	0.78	17343	15584	6585	7720	10758	7864	5464	6430
Small	0.91	1.02	19502	12382	7115	6919	12387	5463	5394	5283
Medium	1.26	1.40	16928	15900	6190	6269	10738	9631	5389	4929
Large	1.00	1.50	9075	10667	8634	7233	441	3434	4840	2133
Total	0.98	1.01	17978	13819	6738	7012	11240	6807	5404	5185
Black gram										
Marginal	0.72	0.88	16344	15900	6525	6577	9819	9323	5718	5690
Small	0.87	1.16	16264	14271	5788	6811	10476	7460	5736	5697
Medium	0.82	1.75	16689	13510	7302	5411	9387	8099	5535	5419
Large	0.85	1.00	10464	10000	6715	9000	3749	1000	5594	5000
Total	0.81	1.19	16080	14313	6362	6422	9718	7891	5679	5610
Green gram										
Marginal	0.82	1.06	12425	10592	5750	5308	6675	5284	2705	5006
Small	0.96	0.97	14805	10948	5153	5963	9652	4985	5047	4901
Medium	1.04	1.58	16490	11234	6959	4589	9531	6645	4859	4999
Large	1.00	2.00	10000	22100	9600	3550	400	18550	5000	5200
Total	0.93	1.10	14308	11128	6056	5434	8252	5694	4938	4964
Aggregate										
Marginal	0.80	0.92	15732	13089	6348	6281	9384	6808	4572	5610
Small	0.91	1.03	17343	12230	6223	6478	11120	5752	5445	5235
Medium	1.04	1.57	16764	13299	6688	5333	10076	7966	5312	5093
Large	0.91	1.50	10017	14367	7642	6300	2375	8067	5301	3380
Total	0.90	1.09	16514	12738	6458	6168	10056	6570	5398	5201

Across various farm size holdings, the productivity was higher for the beneficiary farmers with only exception of large farmers whose productivity was significantly less than control farmers. The cost of production was also slightly higher for the beneficiary farmers compared to control group with the exception of small farmers. Higher cost of beneficiary farmers despite the fact that seed was given free of cost to them indicates intensive use of inputs by the beneficiary farmers compared to control group. The overall returns from pulse

crops were much higher for beneficiary farmers compared to control group. The beneficiary farmers' per acre earning from pulses was Rs 10 thousand as compared to less than Rs 7 thousand for control farmers. The higher earnings per acre by the beneficiary farmers were across all size of holdings except the case of large farmers. In comparison to productivity, cost and returns, price of pulses was not significantly different among the two groups, except the case of large farmers as is seen from the statistics in the table.

Looking at individual crops, per household area under red gram using seed kits averaged at 0.98 acres compared to control group farmers using seed from the market sown that averaged at 1.01 acres. Across various farm size categories, the cultivated area under red gram ranged between slightly less than 1 acre and around 1.5 acres. The value of output per acre averaged around Rs 18 thousand for beneficiaries and Rs 14 thousand for the control group. Across various farm size categories a similar trend of higher productivity for beneficiaries was observed with only exception of large farmers. On the other hand, cost of production was much closer among beneficiaries and control group that averaged around Rs 7 thousand per acre. Net returns per acre, thus had a similar trend as that of value of output. The net returns per acre were observed Rs 11 thousand for beneficiary and Rs 7 thousand for the control group farmers. The price received for red gram averaged at Rs 5.4 thousand per quintal by beneficiary farmers compared to Rs 5.2 thousand for control group.

Black gram and green gram also observed similar trends as interpreted for the case of red gram. The area cultivated per household by beneficiary farmers averaged at 0.8 and 0.9 acres for black and green gram respectively, by beneficiary farmers compared to 1.2 and 1.1 acres for the control group. Productivity averaged at Rs 16 thousand and 14 thousand for beneficiary farmers compared to Rs 14 thousand and 11 thousand, respectively in the case control group for black and green gram, respectively. Like in the case of red gram price differences were not significant in black and green gram as well. The net returns were found higher among the beneficiary farmers compared to control group for both these pulse crops. In the case of black gram net returns per acre averaged at Rs 9.7 thousand compared to Rs 7.9 thousand for control group. Similarly, for green gram average returns were observed Rs 8.3 thousand per acre for beneficiary farmers compared to Rs 5.7 thousand per acre for the control group farmers. The beneficiary farmers across various categories also by and large observed higher returns compared to control group.

Thus, from this comparison, one can conclude that the overall economy of seed minikits (SMK) appears to be advantageous to the farmers and need to be promoted on larger scale. We found that although the overall cost of production of SMK was not less than the

control group but with the advantage of better productivity, the overall returns were much better for SMK farmers compared to control group farmers. The control group farmers were growing same pulses using seeds either bought from the market or using home grown seed which essentially were that of older variety seeds. Compared to this, SMK farmers used seed supplied through seed minikits which were the latest variety provided by the research centres or agricultural universities.

4.2 Item wise details of production cost of beneficiary and non-beneficiary households

The production cost details of black gram, green gram and red gram for SMK beneficiary and non beneficiary (without SMK) users for the reference year are presented in Tables 4.2a, 4.2b and 4.2c, respectively. The main components of cost were land preparation, seed, farmyard manure/organic fertilizer and labour charges. It is clear from the data that labour component alone constituted almost 45-50 per cent cost of production among beneficiary households in all the three pulse crops. Labour cost constituted 47 per cent of total cost in black gram, 50 per cent in green gram and 46 per cent in red gram for the beneficiary households.

Table 4.2a: Cost details item-wise – black gram (%)

Activity	SMK / Without SMK	Marginal	Small	Medium	Large	Total
Land Preparation	SMK	20.83	20.01	20.24	14.89	20.01
	Without SMK	18.53	13.79	12.08	22.22	14.63
Seed	SMK	0.53	2.03	0.99	2.45	1.38
	Without SMK	13.39	12.70	15.31	10.00	13.38
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	16.40	17.35	22.48	18.22	18.43
	Without SMK	14.73	14.88	18.61	22.22	15.91
Major and minor nutrients	SMK	2.00	0.82	2.89	1.20	1.68
	Without SMK	0.00	0.06	1.91	0.00	0.47
Other fertilizer	SMK	1.94	1.84	1.14	0.00	1.59
	Without SMK	8.98	7.35	3.14	0.00	6.52
Irrigation charges	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
Plant protection chemicals	SMK	2.40	3.56	1.83	1.93	2.72
	Without SMK	2.32	3.33	5.48	0.00	3.52
Labour Charges	SMK	50.05	46.30	44.23	58.34	47.45
	Without SMK	38.84	40.11	38.25	37.78	39.35
Weeding and plant protection measures	SMK	1.38	3.40	2.21	0.70	2.41
	Without SMK	0.43	3.51	1.52	6.67	2.49
Harvesting and Threshing	SMK	1.06	1.33	0.49	0.70	1.01
	Without SMK	0.14	1.61	0.92	0.00	1.10
Bagging, transportation and marketing cost	SMK	3.41	3.36	3.50	1.56	3.31
	Without SMK	2.62	2.66	2.77	1.11	2.63
Others	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Total cost (Rs per acre)	SMK	6525	5788	7302	6715	6361
	Without SMK	6577	6811	5411	9000	6422

Among non beneficiary (control group) farmers, labour cost share was slightly less than 40 per cent in both black gram and red gram and 40 per cent in green gram. The second most important component was organic manure/bio fertilizer which constituted around 20 per cent share among beneficiaries and 15 per cent among non beneficiary households for the three selected pulses. Land preparation constituted around 20 per cent share in the total cost for beneficiary farmers while its share was around 15 per cent among control group farmers. Unlike labour, bio fertilizer and land preparation cost, the seed cost was borne only by the control group farmers as SMK beneficiary farmers obtained the seed free of cost. Its share in the total cost was around 12 to 15 per cent for all the three pulse crops. The other cost components that constituted less than 5 per cent share in the cost included, cost for chemical fertilizers/plant protection chemicals, weeding and marketing charges.

Table 4.2b: Cost details item-wise – Green Gram (%)

Activity	SMK/Without	Marginal	Small	Medium	Large	Total
land Preparation	SMK	19.84	17.90	16.83	2.60	17.74
	Without SMK	14.94	15.40	15.42	5.63	15.13
Seed	SMK	0.76	0.96	1.91	2.60	1.22
	Without SMK	15.15	15.20	17.47	16.90	15.59
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	20.27	22.53	20.97	19.79	21.24
	Without SMK	20.21	17.85	16.19	28.17	18.43
Major and minor nutrients	SMK	1.31	1.16	0.00	0.00	0.84
	Without SMK	1.02	1.68	0.57	0.00	1.27
Other fertiliser	SMK	2.32	3.06	4.04	0.00	3.00
	Without SMK	4.20	4.29	11.75	0.00	5.46
Irrigation charges	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
Plant protection chemicals	SMK	0.50	0.81	1.06	0.00	0.76
	Without SMK	0.09	0.43	0.00	0.00	0.25
Labour Charges	SMK	50.90	47.96	47.90	67.71	49.55
	Without SMK	41.40	40.42	36.78	49.30	40.23
Weeding and plant protection measures	SMK	1.31	2.64	2.49	5.21	2.24
	Without SMK	0.22	2.39	0.57	0.00	1.39
Harvesting and Threshing	SMK	0.50	0.58	2.83	1.04	1.22
	Without SMK	0.76	1.19	0.52	0.00	0.93
Bagging, transportation and marketing cost	SMK	2.27	2.41	1.97	1.04	2.19
	Without SMK	2.00	1.16	0.60	1.41	1.33
Others	SMK	0	0	0	0	0
	Without SMK	0	0	0	0	0
Total cost (Rs per acre)	SMK	5750	5153	6942	9600	5880
	Without SMK	5308	5963	4589	3550	5434

Table 4.2c: Cost details item-wise – Red Gram (%)

Activity	SMK/Without	Marginal	Small	Medium	Large	Total
Land Preparation	SMK	20.05	14.92	19.64	11.58	17.42
	Without SMK	15.37	15.71	13.84	14.29	15.20
Seed	SMK	0.28	1.03	1.06	0.00	0.82
	Without SMK	2.56	11.95	12.92	11.98	12.32
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	15.03	23.07	15.44	12.45	18.68
	Without SMK	16.63	13.60	12.98	13.82	14.38
Major and minor nutrients	SMK	1.54	0.93	1.79	2.20	1.35
	Without SMK	0.54	0.44	7.09	0.00	1.68
Other fertilizer	SMK	4.31	2.19	1.45	6.37	2.66
	Without SMK	5.02	5.43	4.67	6.22	5.20
Irrigation charges	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
Plant protection chemicals	SMK	4.91	8.03	9.80	1.74	7.52
	Without SMK	3.46	7.58	3.89	4.61	5.56
Labour Charges	SMK	49.30	44.23	43.96	60.88	45.91
	Without SMK	39.46	38.42	38.88	37.56	38.77
Weeding and plant protection measures	SMK	1.46	1.11	2.51	1.74	1.59
	Without SMK	2.53	3.50	2.34	4.61	3.05
Harvesting and Threshing	SMK	0.25	0.87	1.23	1.74	0.82
	Without SMK	1.59	1.06	0.63	4.61	1.30
Bagging, transportation and marketing cost	SMK	2.87	3.61	3.12	1.30	3.23
	Without SMK	2.80	2.31	2.77	2.30	2.54
Others	SMK	0.00	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00	0.00
Total cost (Rs per acre)	SMK	6585	7010	6190	8634	6738
	Without SMK	7720	6919	6269	7233	7012

Fertilizer and irrigation which generally constitute very higher share in total cost of production was found insignificant in pulses. Pulses are either grown in dryland conditions as was the case in Tumkur district or even if they are cultivated in irrigated conditions as in Mysore, the electricity was available free of cost in Karnataka. Regarding fertilizer, generally pulses are grown in organic conditions or very miniscule amount of chemical fertilizers are used raising pulse crops. Thus, to conclude, land preparation, farm yard manure and labour charges were the major items of cost of production among both beneficiary and control group farmers whereas seed cost was incurred only by control farmers. The cost of fertilizer, pesticides and irrigation was almost negligible and for that reason cost of production for pulses was much lower compared to what farmers incur in other foodgrain, oilseeds and commercial crops. This also provides explanation how farmers survive in growing pulses while its value of productivity is much lower compared to other competing crops.

4.3 Use of human labour in the production of pulses

In general, labour absorption in plantation and horticultural crops is higher compared to field crops. However, among the field crops, the least labour absorption occurs in pulses, as these crops are mostly grown as marginal crops in marginal in the dryland conditions. Therefore, some of the activities generally involved in other crops like irrigation, fertilizer, weeding and so on may be completely missing in pulse crops. The manpower requirement in growing pulses may include, land preparation, sowing, manuring, weeding, harvesting and marketing activities.

Table 4.3: Use of human labour by activities (man days per acre)

Activity	SMK / Without SMK	Black gram	Green gram	Red gram	Total
Land Preparation	SMK	0.83	0.68	0.62	0.71
	Without SMK	0.72	0.78	0.73	0.75
Sowing	SMK	0.91	1.02	1.12	1.02
	Without SMK	0.85	0.85	0.78	0.83
Manure & FYM	SMK	1.04	1.06	1.12	1.08
	Without SMK	0.90	0.86	0.83	0.86
Major and minor nutrients	SMK	0.07	0.07	0.12	0.09
	Without SMK	0.06	0.09	0.07	0.08
Other Fertilizers	SMK	0.11	0.26	0.18	0.17
	Without SMK	0.26	0.19	0.14	0.19
Inter cultural operations	SMK	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00
Plant protection	SMK	0.37	0.16	0.64	0.44
	Without SMK	0.25	0.03	0.39	0.20
Weeding and plant protection measures	SMK	2.33	2.51	2.38	2.39
	Without SMK	2.01	1.54	2.01	1.80
Harvesting and Threshing	SMK	3.14	3.10	2.68	2.93
	Without SMK	2.72	2.33	3.13	2.68
Bagging, Transporting	SMK	0.00	0.00	0.00	0.00
	Without SMK	0.00	0.00	0.00	0.00
Total	SMK	8.80	8.87	8.86	8.84
	Without SMK	7.78	6.68	8.08	7.38

Table 4.3 presents use of human labour in cultivation of pulse crops both by the SMK beneficiary farmers and control group farmers. On the aggregate, only 8.8 days of employment was generated by pulses among SMK farmers and 7.4 days among control group farmers. The highest number of days of work was involved in the activity of harvesting and threshing the produce. Weeding, manuring and sowing were the other main activities in which human labour was mainly used in pulse crops. Fertiliser, plant protection and irrigation were not found important activities in pulses and thereby did not involve much of labour force. The number of days of work was evenly distributed across the three pulse crops and it

averaged at 8-9 days for beneficiaries and 7-8 days for control group farmers for the three selected pulses, namely green gram, red gram and black gram.

4.4 Marketing channels through which pulses sold by selected farmers

Marketing of agricultural commodities in India especially that of grains is mostly done through the network of regulated markets under the Agricultural Produce Marketing Committee Act (APMC) that hitherto was binding on both the sellers and the buyers until recently when the Act was liquidated and direct entry of buyers is allowed to procure the produce from the farm. The procurement of pulses in small quantity is also done in the production belt during the harvest season by the state government although not regularly. In order to confirm the channel of marketing by our selected farmers we enquired them about where they disposed off their produce. The details of marketing channels as indicated by the selected farmers are given in Table 4.4 below.

Table 4.4: Marketing channels through which pulses sold by the selected households
(percentage of output)

Farm Size	Wholesale market	Local market	Village directly	Co-operative	Government agencies	Merchant or pre-arranged Contract	Others	Aggregate
Crop 1 – Black gram								
Marginal	55.81	0.00	0.00	0.00	0.00	44.19	0.00	100.00
Small	59.99	0.00	0.00	0.00	0.00	38.90	1.11	100.00
Medium	74.53	0.00	0.00	0.00	0.00	25.47	0.00	100.00
Large	62.63	0.00	0.00	0.00	0.00	37.37	0.00	100.00
Total	62.79	0.00	0.00	0.00	0.00	36.66	0.55	100.00
Crop 2 – Green Gram								
Marginal	66.06	0.00	0.00	0.00	0.00	33.94	0.00	100.00
Small	62.50	0.00	0.00	0.00	0.00	37.50	0.00	100.00
Medium	78.31	0.00	0.00	0.00	0.00	21.69	0.00	100.00
Large	100.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Total	68.36	0.00	0.00	0.00	0.00	31.64	0.00	100.00
Crop 3 – Red Gram								
Marginal	56.43	0.00	0.00	0.00	0.00	43.57	0.00	100.00
Small	69.70	0.00	0.00	0.00	0.00	28.75	1.54	100.00
Medium	52.49	0.00	0.00	0.00	0.00	47.51	0.00	100.00
Large	78.18	0.00	0.00	0.00	0.00	21.82	0.00	100.00
Total	61.56	0.00	0.00	0.00	0.00	37.79	0.65	100.00

We can see from the table that around 60 to 70 per cent of the produce was sold by our selected farmers to wholesale market or what is better known as agriculture produce market committee mandis (APMCs). The rest of the 30 to 40 per cent produce was sold through traders or merchants who are intermediaries operating mostly at the farm gate level itself. There was no specific trend observed among small versus large farmers. Among our

selected farmers, however, there was no government procurement as none of the selected farmers sold their produce through any government agency.

4.5 Distribution of seed minikits – Socio economic comparison

We have discussed about the economy of the SMK, their productivity, cost, net revenue, employment and marketing aspects in the previous sections of this chapter. The remaining part of the chapter presents various aspects of distribution efficiency of SMK scheme as well as farmers’ opinion and suggestions for the improvement of the programme. The analysis is presented in the following paragraphs.

Table 4.5 presents methods of sowing followed by the selected households during the study period. It is discernible from the statistics that around 88 percent of the households followed line sowing method and remaining farmers were using broadcasting method while drill system was almost negligible. Usually when farmers grow pulse crop along with the perianal crop or other mixed crops, they follow line method and in the study area specifically in Tumkur district, the farmers grow pulses along with coconut or arecanut. A similar pattern was observed across various farm size holdings in the study area for the reference year.

Table 4.5: Method of Sowing followed by Selected Households in reference year (%)

Method	Marginal	Small	Medium	Large	Total
Broadcasting	17 (14.8)	21 (13.5)	3 (4.6)	0 (0.0)	39 (11.4)
Drill sown	1 (0.9)	1 (0.6)	0 (0.0)	0 (0.0)	2 (0.6)
Line Sown	97 (84.3)	133 (85.8)	62 (95.4)	9 (100.0)	301 (88.0)
Sum total	115	155	65	9	342

Table 4.6: Criteria followed in farmer selection for SMK distribution

Farmers	Number	Percentage
Any Interested Farmers	159	68.83
SC/ST	26	11.26
Small/Marginal	46	19.91
BPL	0	0.00
Women	1	0.43
Lottery among applications	0	0.00
Others	0	0.00
Total	231	100.00

Table 4.6 presents criteria followed in farmers’ selection for seed minikits distribution. As was mentioned earlier, SMK eligibility as per scheme guidelines was on the basis of priority

to scheduled caste, schedule tribe, small, marginal and below poverty line farmers. If in a Gram Panchayat, schedule caste and schedule tribal farmers were not available or negligible then only minikits are to be distributed to general category women farmers and minikits are distributed to those farmers who were not benefited during last three years. Against the given criteria, among the selected farmers, scheduled caste and scheduled tribe farmers consisted only 11 per cent. Small and marginal farmers consisted only less than 20 per cent. The selection of farmers seems to be based on first come first serve basis as almost 70 per cent farmers indicated the criterion was any interested farmers. The women farmers obtaining SMK was almost negligible as only one farmer got SMK based on women criterion in the two selected districts. Thus, comparing the distribution of SMK with the scheme guidelines, the distribution was completely violation of the eligibility criterion.

Table 4.7: Number of seed minikit distributed among selected farmers

Farm size	2017	2018	Total	2017	2018	Total
	Numbers			Percentage		
Marginal	23	58	81	28.40	71.60	30.5
Small	25	90	115	21.74	78.26	43.2
Medium	16	46	62	25.81	74.19	23.3
Large	2	6	8	25.00	75.00	3.0
Total	66	200	266	24.81	75.19	100.0
Districts total	33550	62100	95650	35.08	64.92	0.30

Table 4.7 presents numbers of SMK distributed among selected farmers during the year 2017 and 2018. Out of the total selected sample, 75 per cent seed minikits were distributed in the year 2018 and 25 per cent during 2017. As was mentioned elsewhere the distribution of SMK during 2019 was not included in the sample for having details of how the reuse of crop produced was utilized. Out of total selected SMKs, 30 per cent belonged to marginal farmers, 43 per cent small farmers, 23 per cent medium farmers and only 3 per cent belonged to large farmers. The selected sample was only 0.3 per cent of the total numbers of SMK distributed in the two districts.

4.6 Efficiency in the distribution and usage of seed minikits

From Table 4.8, it is discernible that seed minikits were majorly distributed by the Agricultural Department, Government of Karnataka, as almost 97 per cent of the beneficiaries received kit from the agricultural department while only 3 per cent of them received from KVK in the study area. The same pattern of distribution was also seen across different farm size holdings. No kit was distributed by Gram Panchayat or any other authority. As per the

seed minikit eligibility criterion, only one kit has to be distributed to each beneficiary farmer and neither there can be duplication nor the beneficiary can be repeated within a period of three years.

Table 4.8: Name of the agency/authority which distributed seed minikits (Numbers)

Authority/Agency	Marginal	Small	Medium	Large	Total
KVK	4 (5.56)	0 (0)	3 (6.13)	0 (0)	7 (3.04)
Agricultural Departments	68 (94.45)	102 (100)	46 (93.88)	7 (100)	224 (96.97)
Gram Panchayat	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Others	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	72 (100)	102 (100)	49 (100)	7 (100)	231 (100)

While during application for seed minikits, the farmers are required to submit certain set of documents according to the scheme guidelines. Out of selected beneficiaries, almost all of them submitted Aadhar card and pahani or the land records (Table 4.9). There were few others who submitted bank passbook or some other documents but these documents might be in addition to Aadhar card and pahani papers as almost all of them required submitting these papers. The qualifying papers attached for availing SMK were not mutually exclusive and thereby there was some duplication as some farmers submitted more than one paper for meeting the eligibility as is apparent from the table.

Table 4.9: Documents submitted to avail seed minikit (Numbers)

Documents	Marginal	Small	Medium	Large	Total
Aadhar Card	72 (100.0)	103 (100.0)	49 (100.0)	6 (85.7)	230 (99.6)
Pahani (Land records)	71 (98.6)	101 (98.1)	49 (100.0)	7 (100.0)	228 (98.7)
Bank Passbook	26 (36.1)	34 (33.0)	24 (49.0)	1 (14.3)	85 (36.8)
Others	1 (1.4)	6 (5.8)	4 (8.2)	1 (14.3)	12 (5.2)
Total Numbers	72	103	49	7	231

Table 4.10 presents the information on details of seed minikit provided for pulse crops during the study period to the selected farmers. The table also provides details about the amount of seeds provided, area sown thereof, output produced from the seed and how much output was further used as seed for the next year sowing by the beneficiary farmers. On the aggregate, beneficiary households received 4.1 kgs of red gram seed, 4.4 kg of green gram

and 4.3 kg of black gram seed through the minikits. There were only slight variations in the quantity of seeds in the minikits across various farm size holdings. T9, BRG-2 and BRG-4 varieties of red gram seeds, Rashmi variety of green gram seeds and IPU-0243 and IPU-044 variety of black gram seeds were provided through the minikits programme.

Table 4.10: Details of seed minikits provided for pulses crops

Details of seed minikits		Marginal	Small	Medium	Large	Total
Crop 1 – Redgram						
Variety: BRG - 2, BRG - 4 & T9						
Quantity (kgs/hh)		4.06	4.09	4.17	4.00	4.12
Area Sown	Acres total	27.08	42.95	29.00	2.00	101.03
	Acres per hh	0.87	0.91	1.26	1.00	0.98
Season (acres per hh)	Kharfi	0.87	0.91	1.26	1.00	0.98
	Rabi	0.00	0.00	0.00	0.00	0.00
	Summer	0.00	0.00	0.00	0.00	0.00
Output Produced from seed minikits (Quintals per hh)		3.11	3.71	4.15	2.00	3.59
Output used as seed (kgs per hh)		17.29	17.02	19.35	12.50	17.53
Crop 2 – Greengram						
Variety: Rashmi						
Quantity (kgs/hh)		4.38	4.38	4.33	4.00	4.36
Area Sown	Acres total	17.25	20.25	12.45	1.00	50.92
	Acres per hh	0.82	0.96	1.04	1.00	0.93
Season (acres per hh)	Kharfi	0.82	0.96	1.04	1.00	0.93
	Rabi	0.00	0.00	0.00	0.00	0.00
	Summer	0.00	0.00	0.00	0.00	0.00
Output Produced from seed mini kits (Quintals per hh)		2.26	3.04	3.69	2.00	2.87
Output used as seed (kgs per hh)		16.67	20.95	17.50	0.00	18.18
Crop 3 – Blackgram						
Variety: IPU – 0243 & IPU - 044						
Quantity (kgs/hh)		4.47	4.14	4.36	4.40	4.30
Area Sown	Acres total	21.70	38.35	18.00	4.25	82.30
	Acres per hh	0.72	0.87	0.82	0.85	0.81
Season (acres per hh)	Kharfi	0.72	0.87	0.82	0.85	0.81
	Rabi	0.00	0.00	0.00	0.00	0.00
	Summer	0.00	0.00	0.00	0.00	0.00
Output Produced from seed mini kits (Quintals per hh)		2.28	2.60	2.61	1.85	2.47
Output used as seed (kgs per hh)		19.57	13.19	14.18	26.00	15.94

Using the seed provided through minikits, on average households sown 0.98 acres per household of red gram, 0.93 acres of green gram and 0.81 acres of black gram area. As we have already seen in the previous analysis, the productivity of these seeds was higher compared to the seed used from the market by the control group farmers in all the three selected crops. All the three crops using SMK were grown in the kharif season. Out of the total quantity produced by the beneficiary households, a part of the output was used by them for replicating area under pulses in the next season. It is clear from the table that out of 3.6 quintals of output produced using seed minikits in the case of red gram, 17.5 kg was used for

seed purpose for the next season sowing of red gram by the selected beneficiary households. Similarly, in the case of green gram, out of 2.9 quintals of output from seed minikits, 18.1 kg was used for seed purpose in the next season and in the case of black gram, 15.9 kg was used for seed purpose out of total production of 2.5 quintals per household. Thus, the basic objective of the scheme of replicating seeds through beneficiary farmers seem to be working well in all the three crops namely red gram, green gram and black gram in the study area.

Table 4.11: Content of the Seed Minikit (%)

Farm Size	POP	PSP culture (100gms)	Rhizobium (100gms)	Others	None
Marginal	95.83	100.00	97.22	-	-
Small	94.17	100.00	92.23	-	-
Medium	93.88	100.00	93.88	-	-
Large	85.71	100.00	100.00	-	-
Total	94.37	100.00	94.37	-	-

According to the guidelines, the kit should contain Package of Practice (POP), 100 gms of PSP culture and 100 gms of Rhizobium along with 4 kgs of seed. Almost 95 per cent of the beneficiaries received POP and rhizobium whereas 100 percent of the beneficiaries received PSP culture in the kit as statistics given in Table 4.11. The kits contained PSP culture among all size classes, whereas rhizobium was obtained by all the large farmers, 97 per cent marginal farmers, 94 per cent medium farmers and 92 small farmers. Similarly, around 95 per cent of marginal, small and medium farmers obtained POP while 86 per cent of large farmers obtained it.

Table 4.12: Seed purchased by beneficiary and non beneficiary farmers

Crop	Quantity (kgs per hh)	Price (Rs/kg)	Source of purchase (%)			Distance from farm (kms)	Transportation Cost (Rs/kit or kg)
			RSK	Private Dealer	Co-op society		
Seed purchased by beneficiary farmers for reference year through SMK							
Red Gram	4.12	free	100			8.58	19.83
Black Gram	4.30	free	100			7.23	18.89
Green Gram	4.36	free	100			8.03	20.59
Seed purchased by non beneficiary farmers from other sources in reference year							
			Private Dealer	Co-op society	others		
Red Gram	5.52	91.15	39.39	21.21	39.39	9.5	18.75
Black Gram	5.58	92.08	25.00	50.00	25.00	10.33	17.91
Green Gram	6.31	80.09	42.86	45.24	11.90	8.38	17.40

Note: RSK: Raitha Samparka Kendra

Table 4.12 presents comparison of seeds purchased by beneficiary and non beneficiary farmers. Whereas the beneficiary farmers obtained seed in the SMK free of cost, the non beneficiary farmers had to pay around Rs 80 to Rs 92 per kg for the seed. All

beneficiaries obtained the seed through RSKs whereas non beneficiaries bought the seed through private dealers of seed cooperative societies existing mostly in every city or close by towns. Both beneficiary and non beneficiary travelled 8 to 10 kilometers to access the seed and the transportation cost was worked out Rs 20 per kit for the beneficiaries (for 4 kg of seed) and Rs 18 per kg for the non beneficiary households.

4.7 Farmers' source of information about the scheme

The people awareness is necessary for effective implementation of any government programme. It is enviable to comprehend the awareness of the selected households about the scheme as it helps in reviewing the performance of agricultural extension staff involved in the distribution of minikits in the present case. Accordingly, during our field survey, we tried to capture households' awareness about SMK programme and the major sources of information of the households about the programme. Table 4.13 presents the sources through which farmers got acquaintance about the seed minikits programme. The selected farmers obtained awareness about the scheme mostly through the Raitha Samparka Kendra (RSK), farmer facilitator and other fellow farmers. Around 79 per cent of the selected farmers obtained basic information about the programme from agriculture officer working in Raitha Samparka Kendra (RSK). Farmer facilitators and fellow farmers were the other major sources through which rest of the 20 per cent households obtained knowledge about the seed minikits programme. Across farm size, the information about seed minikit was received majorly from the agricultural officers which indicates that these agriculture officers from the department of agriculture play a vital role in bringing awareness about the government programmes among the farmers.

Table 4.13: Households' source of information about SMK scheme (%)

Source	Marginal	Small	Medium	Large	Total
Agriculture Officer (RSK)	60 (75.95)	84 (78.51)	42 (82.36)	7 (100)	193 (79.1)
Farmer Facilitator	12 (15.19)	18 (16.83)	7 (13.73)	0 (0)	37 (15.17)
Fellow Farmer	7(8.87)	5(4.68)	2(3.93)	0(0)	14 (5.74)
Print & Visual media	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
KVK official	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Agricultural University	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Others	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	79 (100)	107 (100)	51 (100)	7 (100)	244 (0)

4.8 Farmers' perceptions about seed minikits

Along with knowing people awareness about the scheme, it is also important to learn beneficiary's perceptions about the scheme. This knowledge will help in further improvisation of the scheme. In this regard, the beneficiary respondents were questioned about their perceptions related to distribution of SMK, quality, usefulness and timeliness of the seeds distributed among them. The respondents' answers and other details are discussed in the following paragraphs. Table 4.14 presents respondents opinion regarding distribution of seed minikits among the beneficiaries. Around 97 per cent respondents pointed out that the seed minikits and the material received in it was really useful for growing pulse crops. Majority of the beneficiary farmers (90 per cent) pointed out that the yield increased when they used the seeds distributed through minikits and 55 percent were of the opinion that there is quality difference in the seeds over what they were using previously. Another 10 percent beneficiaries pointed out that using the seed from the minikits increased profitability of their crop either through better yield or through better price.

Table 4.14: Farmers opinion regarding distribution of SMK for the reference year

Farmers' Opinion		Marginal	Small	Medium	Large	Total
Was seed minikits distribution advantageous	Yes	71 (98.62)	98 (95.15)	49 (100)	6 (85.72)	224 (96.97)
	No	1 (1.39)	5 (4.86)	0 (0)	1 (14.29)	7 (3.04)
a. Yield Difference		63 (87.50)	92 (89.32)	44 (89.80)	7 (100.00)	206 (89.18)
b. Quality difference		34 (47.22)	63 (61.17)	29 (59.18)	1 (14.29)	127 (54.98)
c. More profitable		11 (15.28)	7 (6.80)	5 (10.20)	0 (0.00)	23 (9.96)
d. Short duration of crop		0 (0.00)	1 (0.97)	1 (2.04)	0 (0.00)	2 (0.87)
e. Other		1 (1.39)	1 (0.97)	1 (2.04)	0 (0.00)	3 (1.30)

Similarly, respondents' were enquired about their opinion regarding quantity of seeds supplied in seed minikits during the reference year and how far the quantity supplied was adequate to the needs of farmers. Their responses are captured in Table 4.15. Around 60 percent of the respondents pointed out that the seed supplied through minikits was adequate while other 40 percent pointed out that the quantity was inadequate as 4 kgs of seed which was supplied though seed minikits was sufficient only to sow half an acre of pulse crops. They also opined to increase the supply of seed distributed through these kits. Across various holdings, 30 to 40 per cent of marginal small and large farmers and above 55 per cent

medium farmers indicated that the quantity of seed needs to be raised from the present amount of 4 kg per kit. The marginal farmers have smaller holding size and the large farmers took up pulses as an intercrop along with coconut, aernanut and other crops. Further, the respondents expressed their opinion for increasing the quantity with 22 percent of them requiring 5 to 10 kgs of seeds to be distributed through the kit instead of 4 kgs.

Table 4.15: Farmers opinion regarding quantity of seed supplied in SMK

Sufficient in Quantity (%)	Marginal	Small	Medium	Large	Total
1. Yes	49 (68.06)	61 (59.23)	22 (44.9)	5 (71.43)	137 (59.31)
2. No	23 (31.95)	42 (40.78)	27 (55.11)	2 (28.58)	94 (40.7)
Opinion –how much quantity in kgs should be distributed					
1-5 kgs	7 (9.72)	7 (6.80)	11 (22.45)	0 (0.00)	25 (10.82)
5-10 kgs	15 (20.83)	25 (24.27)	10 (20.41)	1 (14.29)	51 (22.08)
10-15 kgs	1 (1.39)	2 (1.94)	3 (6.12)	0 (0.00)	6 (2.60)
15-20 kgs	0 (0.00)	5 (4.85)	2 (4.08)	0 (0.00)	7 (3.03)
> 20 kgs	0 (0.00)	3 (2.91)	1 (2.04)	1 (14.29)	5 (2.16)

Opinion of respondents about the quality of seeds is presented in Table 4.16. Largely the respondents (84 per cent) were satisfied with the quality of the seed distributed as they opined that the quality was better than the seed available in the market. It is just to note that the seeds distributed in kit were directly fetched from Karnataka State Seed Corporation and National Seed Corporation (NSC) and were distributed by the agriculture department. The respondents expressed that seeds distributed possessed good germination, good grain size with good grain quality and the seeds were drought and disease resistant. We have seen in the previous sections that the yield of SMK seeds were better than the market seeds. However, 16 percent of the respondents were dissatisfied with the quality of the seeds. A similar opinion was seen across various farm size groups.

It is also important to apprehend the timeliness of the distribution of seed minikits along with the quality and quantity of seed supplied as if the kits were distributed after the sowing season it would lose its usefulness. Table 4.17 reveals that almost 90 per cent of the beneficiary respondents were of the opinion that the kits were distributed on time while only 10 per cent pointed out that the kits were not received on time. A few respondents (3 per cent) opined that kits were distributed with a delay of one to two weeks after the sowing season while 5 per cent pointed out delay was as high as 1 to 2 months.

Table 4.16: Farmers opinion regarding quality of seed supplied in seed minikit for the reference year

Quality better than seed available in market (%)	Marginal	Small	Medium	Large	Total
1. Yes	64 (88.89)	81 (78.65)	43 (87.76)	6 (85.72)	194 (83.99)
2. No	8 (11.12)	22 (21.36)	6 (12.25)	1 (14.29)	37 (16.02)
Opinion – Provide reasons					
Good quality with better yield	27 (37.50)	33 (32.04)	21 (42.86)	3 (42.86)	84 (36.36)
Good Germination	12 (16.67)	28 (27.18)	12 (24.49)	3 (42.86)	55 (23.81)
Good grain size and grain quality	14 (19.44)	5 (4.85)	2 (4.08)	0 (0.00)	21 (9.09)
Drought and disease resistance	11 (15.28)	15 (14.56)	8 (16.33)	0 (0.00)	34 (14.72)

Table 4.17: Farmers opinion regarding timeliness of distribution of SMK for the reference year

Timely distribution of Kit (%)	Marginal	Small	Medium	Large	Total
1. Yes	66 (91.67)	89 (86.41)	44 (89.8)	7 (100)	206 (89.18)
2. No	6 (8.34)	14 (13.6)	5 (10.21)	0 (0)	25 (10.83)
Opinion – Provide reasons					
On time distribution	65 (90.28)	86 (83.50)	42 (85.71)	6 (85.71)	199 (86.15)
Advance distribution	1 (1.39)	3 (2.91)	2 (4.08)	0 (0.00)	6 (2.60)
Delayed by 1-2 weeks	1 (1.39)	3 (2.91)	2 (4.08)	0 (0.00)	6 (2.60)
Delayed by 1-2 months	4 (5.56)	8 (7.77)	0 (0.00)	1 (14.29)	13 (5.63)

4.9 Major problems faced by beneficiary farmers

To improve the efficacy in the distribution of seed minikits, it is vital to understand the issues or problems encountered by the respondent farmers in availing the benefits of seed minikits. Table 4.18 presents responses to our question regarding any concerns related to quality and quantity of seeds supplied through SMK to the farmers. Almost 90 percent of our respondent farmers indicated that they didn't encounter any kind of issues or not have concern relating to distribution of seed minikits. Among the farmers who indicated no concerns faced, around 90 per cent were marginal, small and medium farmers and 85 per cent were large farmers who indicated no major issues faced. Rest of the 10 per cent of farmers who indicated having faced problems or issues in availing benefits of the scheme, 7 per cent indicated having documentations and procedural issues and remaining 3-4 percent farmers

indicated that the seed supplied was of poor quality and they faced shortage in sowing the seed for the desired land kept for the subjective crop.

Table 4.18: Major concerns of the farmers in availing the seed minikits for the reference year

SI No.	Concerns/issues	Marginal	Small	Medium	Large	Total
1	No issues	65 (90.28)	94 (91.26)	44 (89.80)	6 (85.71)	209 (90.48)
2	Documentations and procedural issues	5 (6.94)	7 (6.80)	3 (6.12)	1 (14.29)	16 (6.93)
3	Poor quality and shortage of seeds	3 (4.17)	4 (3.88)	2 (4.08)	0 (0.00)	9 (3.90)

Table 4.19 illustrates the deterrents faced by beneficiary farmers in availing the seed minikits during the reference year. Majority (87 per cent) of the sample farmers expressed that they didn't face any problem while availing the seed minikits. However, 9 per cent indicated having faced procedural issues and 2 per cent each indicated having untimely distribution of seed minikits and the process was time consuming. Thus, from the above analysis one can conclude that although a few farmers faced some problems in availing the benefits of the scheme but by and large distribution of seed minikits was smooth, timely and advantageous to the beneficiaries.

Table 4.19: Major problems faced by the beneficiary farmers in availing SMK

SI No.	Problems	Marginal	Small	Medium	Large	Total
1	No problem	66 (91.67)	86 (83.50)	43 (87.76)	5 (71.43)	200 (86.58)
2	Time consuming	1 (1.39)	3 (2.91)	1 (2.04)	0 (0.00)	5 (2.16)
3	Untimely distribution	1 (1.39)	3 (2.91)	0 (0.00)	1 (14.29)	5 (2.16)
4	Procedural problem	4 (5.56)	11 (10.68)	5 (10.20)	1 (14.29)	21 (9.09)

4.10 Major suggestions for improving the effectiveness and reach of the scheme

To overcome the issues/problems faced by the sample beneficiary farm households and to further improve the effectiveness of the scheme, suggestions were sought from the beneficiary farmers. Their responses are summarized in Tables 4.20 and 4.21. What are the measures required to improvise the scheme, around 26 percent of the sample farmers suggested to increase the quantity of seeds supplied and make the distribution of seed minikits timely as these two measures will make the scheme much more effective. Around 23 per cent beneficiaries indicated to include other crops under the ambit of this scheme.

Although, the scheme is available in other nutri cereals and some other crops as well but none of our beneficiary households availed benefit of this scheme other than pulses.

Around 13 per cent of the beneficiaries pointed out to create awareness about the scheme will broaden its scope and help in making the scheme more inclusive. It is to be pointed out that although, the scheme was mainly targeted to SC/ST, women and other poor and small and marginal farmers. However, due to lack of knowledge among those classes, the targeted groups were not very well represented in the scheme as has been pointed out in the beginning of this chapter. Among other suggestions, providing technical guidance along with kits and methods of demonstration and how to use the rhizobium and PSB which are provided in the minikit were indicated by around 10 per cent households. Supply the improved variety of seeds like short duration, drought and pest resistant varieties and provide ICT and market information about the crops (seeds) supplied in the kit were the other major suggestions provided by the beneficiary households.

Table 4.20: Households' suggestion to improve the effectiveness of the scheme

SI No.	Measures	Marginal	Small	Medium	Large	Total
1	Technical guidance	2 (2.78)	17 (16.50)	4 (8.16)	0 (0.00)	23 (9.96)
2	Increase the supply and timely distribution of seeds	21 (29.17)	22 (21.36)	15 (30.61)	2 (28.57)	60 (25.97)
3	Include more number of crops	23 (31.94)	20 (19.42)	8 (16.33)	2 (28.57)	53 (22.94)
4	Improve variety	6 (8.33)	12 (11.65)	2 (4.08)	0 (0.00)	20 (8.66)
5	Provide ICT and market information	2 (2.78)	2 (1.94)	5 (10.20)	0 (0.00)	9 (3.90)
6	Create awareness	5 (6.94)	14 (13.59)	8 (16.33)	2 (28.57)	29 (12.55)

Table 4.21: Farmers suggestions to improve the reach of the Scheme

SI No.	Suggestions	Marginal	Small	Medium	Large	Total
1	Publicity	33 (45.83)	41 (39.81)	14 (28.57)	2 (28.57)	90 (38.96)
2	Increase the beneficiary	6 (8.33)	14 (13.59)	11 (22.45)	3 (42.86)	34 (14.72)
3	Increase the quantity of seed	6 (8.33)	11 (10.68)	2 (4.08)	0 (0.00)	19 (8.23)
4	Conduct meetings and demonstration	20 (27.78)	21 (20.39)	4 (8.16)	0 (0.00)	45 (19.48)
5	Impart training and information	15 (20.83)	28 (27.18)	14 (28.57)	3 (42.86)	60 (25.97)

Last but not the least we also sought suggestions regarding how to improve the reach of the farmers to the scheme. About 40 percent of the selected sample farmers suggested to

provide wider publicity to the scheme by reaching out to more and more farmers especially the weaker sections of the farming community. In this regards, ICT should be made use and mobile phone message, voice and video call could prove very informative to the farmers. Using local newspapers and local radio and television stations for spreading information would be much useful. Around 26 per cent pointed out imparting training and information through extension services could broaden the reach of the scheme. Similarly, personal meetings and demonstration also could raise the reach out to farmers and increase the number of beneficiaries and the quantity of seed provided was the other suggestions from the selected farmers.

4.11 Summary of the chapter

Area under selected three pulse crops averaged at around slightly less than one acre per household among the beneficiary farmers and slightly above one acre among the control group farmers who were selected from the vicinity of the beneficiary farmers so that there is no bias in the comparison of the two categories. The value of crop productivity per acre was much higher for the beneficiary farmers as compared to control group. The cost of production was also slightly higher for the beneficiary farmers compared to control group with the exception of small farmers. The overall returns from pulse crops were much higher for beneficiary farmers compared to control group. The beneficiary farmers' per acre earning from pulses was Rs 10 thousand as compared to less than Rs 7 thousand for control farmers. Thus, from this comparison, one can conclude that the overall economy of seed minikits (SMK) appears to be advantageous to the farmers and need to be promoted on larger scale.

Regarding distribution efficiency of seed minikits, comparing the distribution of SMK with the scheme guidelines, the distribution was completely violation of the eligibility criterion. The selected farmers obtained awareness about the scheme mostly through the Raitha Samparka Kendra (RSK), farmer facilitator and other fellow farmers. Majority of the beneficiary farmers pointed out that the yield increased when they used the seeds distributed through minikits. Similarly, majority of farmers were of the opinion that there is quality difference in the seeds over what they were using previously. Around 60 percent of the respondents pointed out that the seed supplied through minikits was adequate while other 40 percent pointed out that the quantity was inadequate. Further, the respondents expressed their opinion for increasing the quantity requiring 5 to 10 kgs of seeds to be distributed through the kit instead of 4 kgs.

Largely the respondents were satisfied with the quality of the seed distributed as they opined that the quality was better than the seed available in the market. The respondents expressed that seeds distributed possessed good germination, good grain size with good grain quality and the seeds were drought and disease resistant. Regarding timeliness of the seed minikits distribution, almost 90 per cent of the beneficiary respondents were of the opinion that the kits were distributed on time. Thus, from the above analysis one can conclude that although a few farmers faced some problems in availing the benefits of the scheme but by and large distribution of seed minikits was smooth, timely and advantageous to the beneficiaries.

Annexure 4.1

Notes from Field

Farmers' opinion regarding seed minikits

- Quality of Seeds supplied is very good
- Supply the variety of the seed which are suitable for the locality
- Drought resistance variety is required
- Information spread about the scheme is very low
- Overall response of the scheme is good
- Seed supplied is inadequate

Insights from field

- Labour is most expensive
- Dearth of labour
- No set criteria for distribution of seed minikits
- 30 per cent of the seed received are defunct
- Some farmers have retained the seeds for the next sowing season
- Very less women farmers are covered
- No demonstration/ training given on how to use the minikits
- Random selection/ distribution
- Untimely supply of minikits

Way forward

- Demonstration should be given before distributing the seed minikits
- Awareness should be created about the scheme through pamphlet, hoarding, etc.

Chapter V

Summary of Findings and Policy Suggestions

Agriculture accounts for a considerable amount of India's economic development, as it provides food for more than 1.2 billion people and employment to about 54.6 per cent (Census, 2011) of the population. India is the world's second largest producer of rice, wheat and other cereals. The huge demand for cereals in the global market is creating an excellent environment for the export of Indian cereal products (APEDA). India is by and large vegetarian in dietary habit and heavily depends upon vegetative source to meet out its daily protein requirement. 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 (Singh *et.al* 2015) 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. Therefore, to raise the domestic production of pulses the Central and state governments have initiated various programme oriented at rising production of pulses though enhancement in area as well as productivity of pulses. NFSM, ISOPOM and several other programmes are implemented since the beginning of the Century. Seed Minikits is another such programme. This report analyses the relevance and distribution efficiency of seed minikits programme in pulses.

5.1 The aim of seed mini-kits programme

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. Central Seed Agencies deliver allotted seed minikits to the destination identified by the beneficiary states within the stipulated time. 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 price of seed minikits is fixed by the NFSM Mission Director at National level and 100 per cent cost is reimbursed to the agencies on certification of receipt by the state. The allocation of seed minikits is approved by the NFSM-EC before commencement of kharif/rabi/summer seasons.

The required leaflets on cultural practices should be kept in the seed minikits along with rhizobium /PSB culture wherever it is required in the respective seed packet of minikits. The cultural practices should be printed in Hindi, English and local languages for the respective states. The agencies should deliver the consignment up to district headquarters level of the respective state governments, beyond which the distribution of seed minikits should be taken care by the state department of agriculture.

After receiving the minikits at destination place of the district, proper distribution of minikits within 10 days to the appropriately identified farmers must be ensured by the district level agriculture officer, concerned. The purpose is to ensure, that the identified farmer is capable of raising the crop with care and diligence such that the plot serves as a good demonstration to other farmers. Only one minikit per farmer and not more than 3 minikits in a season and a village are to be distributed. Following are the eligibility criteria for receiving seed minikits by the farmers:

- 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 Women farmers 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, Schedule caste and Schedule tribal 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 during last three years.
- Priority will be given to those farmers having irrigation facilities.

5.2 Distribution of seed minikits in pulses

In order to promote quick spread of new varieties of pulses, minikits of pulses seed varieties not older than 10 years are provided free of cost to farmers. 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, urd and pigeon pea. This quantity would be sufficient to plant 0.2 ha. In addition, under this package, Karnataka state government 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. 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.

5.3 Need for the study

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 initiated to examine the need, application, pertinence and efficiency in distribution of seed minikits.

5.4 Objectives of the study

The objectives of the study are as follows:

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.

5.5 Data and methodology

Regarding primary field survey, two districts were selected, one irrigated and one dryland based on the available list of households with highest seed minikits distributed in the district during the reference period of 2017-18 and 2018-19. Based on the above criterion, we selected Mysore as an irrigated district and for dryland, Tumkur district was selected. A total number of 231 beneficiaries and 111 non beneficiaries were selected from Mysore and Tumkur districts in Karnataka making the total number of selected farmers up to 342.

In order to select households, the seed minikits distribution list was collected for the year 2017-18 and 2018-19. While selecting the households, the sample was included for both these years. During the field survey, we collected information on area sown, productivity and resources used for seed minikits pulse crops as well as the reproduced seed pulse crops. In order to capture authentic data, efforts were made to interview the heads of households. The

reference period of survey data was 2018-19, i.e., Kharif (July-Nov 2018), Rabi (Nov 2018 to March 2019) and Summer (March-June 2019).

5.6 Major findings based on secondary data

Karnataka state is the leading producer of pulses and oilseeds in which India has deficit in supply over demand and thereby these commodities constitute major items in the country's import bill. The pulses constituted around 11.6 per cent area in India and around 8 per cent share of production in 2018-19. Pulses production in Karnataka increased from around 8 lakh tonnes in TE 1990-91 to 18.6 lakh tonnes in 2018-19. In Karnataka, the share of pulses to gross cropped area was around 20 per cent during the early 1990s which came down to less than 15 per cent in the late 1990s but picked up after the beginning of several pulse's promotion programmes like ISOPOM and National Food security Mission which were started in the mid-2000s. During the later years of 2010, its share surpassed 20 per cent and at present it is near 25 per cent of the gross cropped are in the state.

Among the three selected pulse crops, there was perceptible increase in area and production only in red gram (tur) as compared to black gram (urad) and green gram (moong). Area under black gram was almost stagnant at around 1 lakh hectares while green gram area slightly increased from 2.4 lakh hectares in TE 1990-91 to around 3.5 hectares in TE 2016-17. On the other hand area under red gram, i.e., tur crop increased from around 5 lakh hectares in the early 1990s to 8.7 lakh hectares in TE 2016-17. Similarly, production of black gram and green gram remained stagnant at around 50 thousand and less than 1 lakh tones, respectively in the entire period from 1990-91 to 2016-17. Production of tur, on the other hand increased from 1.7 lakh tones in TE 1990-91 to more than 5 lakh tones in TE 2016-17, an increase of almost three times. Jointly, these three pulse crops contributed around 1/3rd share in area and production of total pulses in the state in the early 1990s whereas their share in area and production increased to slightly less than half by TE 2016-17. The increase in share in both area and production was mainly contributed by red gram whereas share of other two pulses in production declined during the reference period.

Against, mostly the negative growth in area of rice and course cereals, pulses saw significant negative growth in area in the decade of 1988-89 to 1997-98 but underwent significant positive growth in area at the rate of 2.5 and 3 per cent per annum during the 1998-99 to 2007-08 and 2008-09 to 2017-18, respectively. Against the negative trends in area, the yield growth was observed positive throughout the period of three decades in pulses but increase in area was consistent with significant growth, the yield rate was insignificant

throughout the three decades' period with volume remaining only 1-2 per cent per annum. The lack of significant positive growth in yield in pulses was possibly caused by the dry-land nature of pulses in the state and also due to rising uncertainty in rainfall pattern and fluctuating temperature due to the effect of climate change in the recent past.

Summarizing the growth rates in area and yield of three individual pulse crops namely, black gram, red gram and green gram, very interesting statistics can be seen from the table. Whereas black gram observed significant positive growth in area during the first decade, the area growth in other two pulses remained negative and insignificant during this period. On the opposite, growth rate in area of black gram during the next two decades remained insignificant and negative or negligible. Growth in area under red gram and green gram during the next two decades, on the other hand, was positive and mostly significant. The above analysis of area growth indicates some diversification within pulses happening in Karnataka from black gram toward red gram and green gram. Yield growth in the three pulses mostly remained insignificant although the growth rate was high and positive in all the three pulses during the last decade.

Out of around 1.5 lakh seed minikits distributed for pulses in Karnataka, around 57 per cent alone were distributed for the red gram which is one of the most important pulse crops grown in Karnataka. Red gram was followed by black gram and green gram with a share of around 19.6 and 18.6 per cent, respectively. The remaining pulses shared only rest of the around 5 per cent share of seed minikits distributed in the state. Thus, given the fact that mainly three pulse crop minikits viz., red gram, black gram and green gram were distributed to the farmers under this scheme, we selected these three crops for this study for carrying out the primary survey.

Looking at the distribution of seed minikits of pulse crops together for the three years (from 2017 to 2019) in different districts in the state, the highest number of minikits were distributed in Gulbarga district (14.4 per cent of total minikits) followed by Bijapur district (9.8 per cent), Bidar (8.3 per cent), Yadgir (6.8 per cent), Raichur (5.7 per cent), Tumkur (5.3 per cent), Chitradurga (4.8 per cent), Chamarajnaragar (3.9 per cent), Belgaum (3.8 per cent) and Mysore (3.7 per cent). Based on different agro climatic regions, we selected Mysore as irrigated district and Tumkur as dryland district for the primary survey for this study. A total number of 342 farmers consisting of 231 beneficiary households and 111 non beneficiary households were selected based on the list of beneficiaries provided by the officials of the agriculture department in the concerned districts.

5.7 Major findings based on primary survey

5.7.1 Household characteristics, cropping pattern and value of output

Among the selected sample, beneficiary households constituted 67.5 per cent of the sample while control group constituted that of 32.5 per cent. Across various sizes of holdings, marginal and small farmers constituted 34 and 45 per cent of the sample, respectively while medium and large farmers constituted 19 and 3 per cent, respectively. It is notable here that the seed minikits scheme is basically meant for SC/ST, women and small and marginal farmers. Among the beneficiaries, small and marginal farmers constituted a share of 31 and 45 per cent, respectively while medium and large farmers had 24 per cent share in the sample.

The average family size of the household was 2.63 members per household. Sample farmers had around 29 years of farming experience and around 2.3 members of the family were engaged in farming activities. As high as 93 per cent of the heads of the sample were male and only 7 per cent were female. On average, above 70 per cent of the respondents were in the age group of 30-60 years and more than 20 per cent were above 60 years. Among the selected households, around 20 per cent of the respondents were illiterate while around 55 per cent were matriculate or below. Only around 6 per cent were graduates and 5 per cent were post-graduates. The lower level of education also reveals poor economic condition of the sample households. The sample had representation of General category (57 per cent), OBC (20 per cent), Scheduled castes (15 per cent) and Scheduled Tribes (8 per cent). Although the seed minikits scheme was targeted towards SC and ST farmers, the majority of sample belonged to the general category households. This indicates that either there was misappropriation of the programme by general category households or the allocation of seed minikits by authorities was not implemented as per the basic objective of the scheme.

Analysis of occupation of head of the households indicated that almost all households were engaged in agriculture and allied activities as their main occupation. Only less than one per cent were engaged in agriculture labour activities. Last but not the least, the annual income of the selected households on average was measured at Rs 1.5 lakh which varied from less than Rs 1 lakh for the marginal farmers, Rs 2 lakh for medium farmers and above Rs 7 lakh for the large farmers. Small and marginal farmers depended much on the subsidiary occupation for their livelihood as compared to medium and large farmers.

On average, the net operated area per household of the selected sample was 4.14 acres. The number of large and medium farmer in the sample was around 20 per cent only. The cropping intensity was measured only 1.3. The substantially low cropping intensity among the sample farmers was because of predominance of dryland nature of the agriculture

in which there was preponderance of pulse crops in the cropping pattern. Almost 60 percent of the net operated area among the sample households was under rainfed conditions. The rest of 40 percent was irrigated mainly by bore wells and canal.

Among the selected farmers, pulses occupied around 40 per cent of the total cropped area with proportion of around 10 per cent each by red gram, green gram and black gram and additional 10 per cent area occupied by other pulses like cowpeas, horse gram and field beans. Cereals including paddy and ragi accounted for 33 per cent area and perennials 14 per cent. In addition to above mentioned crops, around 13 per cent area at the aggregate was covered by other crops which included oilseeds and other commercial crops.

On average, the net earnings per household was Rs 77 thousand per annum and its range was noted as Rs 32 thousand for marginal farmers, Rs 69 thousand for small farmers, Rs 1.36 lakh for medium farmers and Rs 3.6 lakh for the large farmers. Per acre output was much evenly distributed across small and large farmers. Its value was highest Rs 37 thousand per acre in the case of large farmers, Rs 34 thousand for medium and small farmers and Rs 33 thousand for the marginal farmers. The cost of production per acre although did not show any particular trend but it was highest for large farmers and lowest for the medium farmers. The net returns from agriculture (FBI) showed an inverse trend with large farmers having not only highest returns per household but also per acre. At the aggregate farm business income per acre averaged at Rs 18.5 thousand that varied from Rs 16.8 thousand in the case of marginal farmers, Rs 18 thousand for small farmers, Rs 19 thousand for medium farmers and Rs 20 thousand for large farmers.

5.7.2 Efficiency of seed minikits distribution in Karnataka

At the aggregate, area under selected three pulse crops averaged at around slightly less than one acre per household among the beneficiary farmers and slightly above one acre among the control group farmers who were selected from the vicinity of the beneficiary farmers so that there is no bias in the comparison of the two categories. The value of crop productivity per acre was much higher for the beneficiary farmers as compared to control group. At the aggregate value of output per acre for the beneficiary farmers was Rs 16.5 thousand compared to 12.7 thousand for the control group farmers. Across various farm size holdings, the productivity was higher for the beneficiary farmers with only exception of large farmers whose productivity was significantly less than control farmers. The cost of production was also slightly higher for the beneficiary farmers compared to control group with the exception of small farmers.

The overall returns from pulse crops were much higher for beneficiary farmers compared to control group. The beneficiary farmers' per acre earning from pulses was Rs 10 thousand as compared to less than Rs 7 thousand for control farmers. The higher earnings per acre by the beneficiary farmers were across all size of holdings except the case of large farmers. In comparison to productivity, cost and returns, price of pulses was not significantly different among the two groups, except the case of large farmers.

Looking at individual crops, per household area under red gram using seed kits averaged at 0.98 acres compared to control group farmers using seed from the market sown that averaged at 1.01 acres. The value of output per acre averaged around Rs 18 thousand for beneficiaries and Rs 14 thousand for the control group. Net returns per acre were observed Rs 11 thousand for beneficiary and Rs 7 thousand for the control group farmers. The price received for red gram averaged at Rs 5.4 thousand per quintal by beneficiary farmers compared to Rs 5.2 thousand for control group. Black gram and green gram also observed similar trends as interpreted for the case of red gram. The area cultivated per household by beneficiary farmers averaged at 0.8 and 0.9 acres for black and green gram respectively, by beneficiary farmers compared to 1.2 and 1.1 acres for the control group. Productivity averaged at Rs 16 thousand and 14 thousand for beneficiary farmers compared to Rs 14 thousand and 11 thousand, respectively in the case control group for black and green gram, respectively. Like in the case of red gram price differences were not significant in black and green gram as well. The net returns were found higher among the beneficiary farmers compared to control group for both these pulse crops also. In the case of black gram net returns per acre averaged at Rs 9.7 thousand compared to Rs 7.9 thousand for control group. Similarly, for green gram average returns were observed Rs 8.3 thousand per acre for beneficiary farmers compared to Rs 5.7 thousand per acre for the control group farmers. The beneficiary farmers across various categories also by and large observed higher returns compared to control group.

Thus, from this comparison, one can conclude that the overall economy of seed minikits (SMK) appears to be advantageous to the farmers and need to be promoted on larger scale. We found that although the overall cost of production of SMK was not less than the control group but with the advantage of better productivity, the overall returns were much better for SMK farmers compared to control group farmers. The control group farmers were growing same pulses using seeds either bought from the market or using home grown seed which essentially were that of older variety seeds. Compared to this, SMK farmers used seed

supplied though seed minikits which were the latest variety provided by the research centres or agricultural universities.

The main components of production costs were land preparation, seed, farmyard manure/organic fertilizer and labour charges. Labour component alone constituted almost 45-50 per cent cost of production. The second most important component was organic manure/bio fertilizer and land preparation which each constituted around 15-20 per cent share. Unlike labour, bio fertilizer and land preparation cost, the seed cost was borne only by the control group farmers as SMK beneficiary farmers obtained the seed free of cost. Its share in the total cost was around 12 to 15 per cent for all the three pulse crops. Fertilizer and irrigation which generally constitute very higher share in total cost of production was found insignificant in pulses. Pulses are either grown in dryland conditions as was the case in Tumkur district or even if they are cultivated in irrigated conditions as in Mysore, the electricity was available free of cost in Karnataka. Regarding fertilizer, generally pulses are grown in organic conditions or very miniscule amount of chemical fertilizers are used raising pulse crops. Thus, to conclude, land preparation, farm yard manure and labour charges were the major items of cost of production among both beneficiary and control group farmers whereas seed cost was incurred only by control farmers. The cost of fertilizer, pesticides and irrigation was almost negligible and for that reason cost of production for pulses was much lower compared to what farmers incur in other foodgrain, oilseeds and commercial crops.

On the aggregate, only 8.8 days of employment per acre was generated by pulses among SMK farmers and 7.4 days among control group farmers. Regarding marketing of pulse crops, 60 to 70 per cent of the produce was sold by our selected farmers to wholesale market or what is better known as agriculture produce market committee mandis (APMCs). The rest of the 30 to 40 per cent produce was sold through traders or merchants who are intermediaries operating mostly at the farm gate level itself. Among our selected farmers there was no government procurement as none of the selected farmers sold their produce through any government agency. The objective of the study is to analyze various aspects of distribution efficiency of SMK scheme as well as farmers' opinion and suggestions for the improvement of the programme.

Against the criteria of distribution of seed minikits among, scheduled caste, scheduled tribe, women and small and marginal farmers, scheduled caste and scheduled tribe farmers consisted only 11 per cent in the selected sample. Small and marginal farmers consisted only less than 20 per cent. The selection of farmers seems to be based on first come first serve as almost 70 per cent farmers indicated the criterion was any interested farmers. The women

farmers obtaining SMK was almost negligible as only one farmer got SMK based on women criterion in the two selected districts. Thus, comparing the distribution of SMK with the scheme guidelines, the distribution was completely violation of the eligibility criterion.

Seed minikits were majorly distributed by the Agricultural Department, Government of Karnataka. Out of selected beneficiaries, almost all of them submitted Aadhar card and pahani or the land records. On the aggregate, beneficiary households received 4.1 kgs of red gram seed, 4.4 kg of green gram and 4.3 kg of black gram seed through the minikits. There were only slight variations in the quantity of seeds in the minikits across various farm size holdings. Using the seed provided through minikits, on average households sown 0.98 acres per household of red gram, 0.93 acres of green gram and 0.81 acres of black gram area. All the three crops using SMK were grown in the kharif season. Out of the total quantity produced by the beneficiary households, a part of the output was used by them for replicating area under pulses in the next season. Out of 3.6 quintals of output produced using seed minikits in the case of red gram, 17.5 kg was used for seed purpose for the next season sowing of red gram by the selected beneficiary households. Similarly, in the case of green gram, out of 2.9 quintals of output from seed minikits, 18.1 kg was used for seed purpose in the next season and in the case of black gram, 15.9 kg was used for seed purpose out of total production of 2.5 quintals per household. Thus, the basic objective of the scheme of replicating seeds through beneficiary farmers seem to be working well in all the three crops in the study area.

According to the guidelines, the kit should contain Package of Practice (POP), 100 gms of PSP culture and 100 gms of Rhizobium along with 4 kgs of seed. Almost 95 per cent of the beneficiaries received POP and rhizobium whereas 100 percent of the beneficiaries received PSP culture in the kit. Whereas the beneficiary farmers obtained seed in the SMK free of cost, the non beneficiary farmers had to pay around Rs 80 to Rs 92 per kg for the seed. Both beneficiary and non beneficiary travelled 8 to 10 kilometers to access the seed and the transportation cost was worked out Rs 20 per kit for the beneficiaries (for 4 kg of seed) and Rs 18 per kg for the non beneficiary households.

The selected farmers obtained awareness about the scheme mostly through the Raitha Samparka Kendra (RSK), farmer facilitator and other fellow farmers. Around 79 per cent of the selected farmers obtained basic information about the programme from agriculture officer working in Raitha Samparka Kendra (RSK). Farmer facilitators and fellow farmers were the other major sources through which rest of the 20 per cent households obtained knowledge about the seed minikits programme.

Around 97 per cent respondents pointed out that the seed minikits and the material received in it was really useful for growing pulse crops. Majority of the beneficiary farmers (90 per cent) pointed out that the yield increased when they used the seeds distributed through minikits and 55 percent were of the opinion that there is quality difference in the seeds over what they were using previously. Another 10 percent beneficiaries pointed out that using the seed from the minikits increased profitability of their crop either through better yield or through better price. Around 60 percent of the respondents pointed out that the seed supplied through minikits was adequate while other 40 percent pointed out that the quantity was inadequate as 4 kgs of seed which was supplied through seed minikits was sufficient only to sow half an acre of pulse crops. They also opined to increase the supply of seed distributed through these kits. Further, the respondents expressed their opinion for increasing the quantity with 22 percent of them requiring 5 to 10 kgs of seeds to be distributed through the kit instead of 4 kgs.

Largely the respondents (84 per cent) were satisfied with the quality of the seed distributed as they opined that the quality was better than the seed available in the market. It is just to note that the seeds distributed in kit were directly fetched from Karnataka State Seed Corporation and National Seed Corporation (NSC) and were distributed by the agriculture department. The respondents expressed that seeds distributed possessed good germination, good grain size with good grain quality and the seeds were drought and disease resistant. However, 16 percent of the respondents were dissatisfied with the quality of the seeds. Regarding timeliness of the seed minikits distribution, almost 90 per cent of the beneficiary respondents were of the opinion that the kits were distributed on time while only 10 per cent pointed out that the kits were not received on time. A few respondents (3 per cent) opined that kits were distributed with a delay of one to two weeks after the sowing season while 5 per cent pointed out delay was as high as 1 to 2 months.

Around 90 percent of our respondent farmers indicated that they didn't encounter any kind of issues or not have concern relating to distribution of seed minikits. Rest of the 10 per cent of farmers who indicated having faced problems or issues in availing benefits of the scheme, 7 per cent indicated having documentations and procedural issues and remaining 3-4 percent farmers indicated that the seed supplied was of poor quality and they faced shortage in sowing the seed for the desired land kept for the subjective crop. Thus, from the above analysis one can conclude that although a few farmers faced some problems in availing the benefits of the scheme but by and large distribution of seed minikits was smooth, timely and advantageous to the beneficiaries.

5.8 Major suggestions for improving the effectiveness and reach of the scheme

What are the measures required to improvise the scheme, around 26 percent of the sample farmers suggested to increase the quantity of seeds supplied and make the distribution of seed minikits timely as these two measures will make the scheme much more effective. Around 23 per cent beneficiaries indicated to include other crops under the ambit of this scheme. Around 13 per cent of the beneficiaries pointed out to create awareness about the scheme will broaden its scope and help in making the scheme more inclusive. It is to be pointed out that although, the scheme was mainly targeted to SC/ST, women and other poor and small and marginal farmers. However, due to lack of knowledge among those classes, the targeted groups were not very well represented in the scheme.

Among other suggestions, providing technical guidance along with kits and methods of demonstration and how to use the rhizobium and PSB which are provided in the minikit were indicated by around 10 per cent households. Supply the improved variety of seeds like short duration, drought and pest resistant varieties and provide ICT and market information about the crops (seeds) supplied in the kit were the other major suggestions provided by the beneficiary households.

Regarding how to improve the reach of the farmers to the scheme, about 40 percent of the selected sample farmers suggested provision of wider publicity to the scheme by reaching out to more and more farmers especially the weaker sections of the farming community. In this regards, ICT should be made use and mobile phone message, voice and video call could prove very informative to the farmers. Using local newspapers and local radio and television stations for spreading information would be much useful. Around 26 per cent pointed out imparting training and information through extension services could broaden the reach of the scheme. Similarly, personal meetings and demonstration also could raise the reach out to farmers and increase the number of beneficiaries and the quantity of seed provided was the other suggestions from the selected farmers.

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ANNEXURE 5.1

Reply to the Referee Comments

(I) Title of the Draft Study Report Examined:

Title of the study is bit confusing. It may be changed as “An Analysis of the Distribution Efficiency of Pulses seeds under Seedminikit Program in Karnataka”.

Answer: Appropriate changes are made in the title of the report.

(II) Comments on the Objectives of the Study:

Objectives of the study are fine. But it can be stated much before the lengthy discussion of the seedminikit program and the overall pulses scenario. I would suggest briefly discussing about the pulse scenario and then the seedminikit program and then the objectives. Pulse scenario and seedminikit program can be discussed in detail after that. It can even be separate chapters.

Answer: Readjustments are made in the Introduction chapter while bringing the objectives and methodology upfront.

Aslo NFSM is not expanded when it is discussed first (page no.5). Please add one or two paragraphs on what is NFSM and NFSM pulses and then say the seedminikit program is implemented within NFSM.

Answer: Detailed note is provided on NFSM Pulses in Chapter 1.

(III) Comments on the Methodology:

Its fine. But the districts selected can be mentioned in the first chapter under the heading of data and methodology.

Answer: The methodology section gives names of the selected districts while sampling procedure is discussed in details in the analysis chapter 3.

(IV) Comments on the Presentation, Get up etc.

References are not listed properly. Many citations are there in the list. Please list all references.

Answer: References are rearranged and all cited references are now given in the list of references.

It is mentioned that 10% of total cost of minikit is charged from farmers as a token money. How much it is? Are there any variations across the states?

Answer: Actual cost of the seed minikits is not known as these are procured and distributed to the farmers by the union or state government.

What are the training programs conducted by the states' agri departments to educate farmers about the seedkit.

Answer: The surveyed farmers did not receive any training programme.

No literature review: There can be some discussion about the studies undertaken in similar context, even if it is for some other countries and some other crops.

Answer: Introduction chapter includes studies on cultivation of pulses which highlights studies on cultivation of pulses.

(V) Overall View on Acceptability of the Report:

The report is acceptable.

Appendix Tables

Appendix Table 1.1A: Crop-wise distribution of seed-minikits (2016-17 to 2018-19)

(Qty: quintal)

Season/ crop	Seed minikits distribution					
	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
Grand total	785289	54387	809500	60975	900000	67283
Total Budget Allocation (Rs. in Cr)	61.74		75.01		76.71	

Source: NFSM Cell, Min. of Agri. & FW (DAC&FW)

Appendix Table 1.2A: State-wise distribution of seed minikits (2016-17 to 2017-18)

(Minikits-numbers)

Sl. No	States	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	Jammu & 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	Odisha	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: NFSM Cell, Min. of Agri. & FW (DAC&FW)

Appendix Table 1.3A: Agency wise distribution of seed minikits (2016-17)

(Minikits-Numbers)

SI No.	Agency	Kharif		Rabi		Summer	
		Target	Achievement	Target	Achievement	Target	Achievement
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

Source: NFSM Cell, Min. of Agri. & FW (DAC&FW)

Appendix Table 1.4A: Agency wise distribution of seed minikits (2017-18)

(Minikits-Numbers)

SI No.	Agency	Kharif		Rabi		Summer	
		Target	Achievement	Target	Achievement	Target	Achievement
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

Source: NFSM Cell, Min. of Agri. & FW (DAC&FW)

Appendix Table 2.1A: Year wise distribution of seed minikits in the state (numbers)

Karnataka	Redgram			Blackgram			Green gram			Others			Grand Total
	2017	2018	2019	2017	2018	2019	2017	2018	2019	2017	2018	2019	
Bagalkote	350 (13.21)	1400 (52.84)	900 (33.97)	0(0)	0(0)	0(0)	1000 (45.46)	500 (22.73)	700 (31.82)	500 (100)	0(0)	0(0)	5350 (3.67)
Bangalore - urban	0(0)	1000 (50)	1000 (50)	0(0)	175 (77.78)	50 (22.23)	0(0)	25 (100)	0(0)	0(0)	0(0)	0(0)	2250 (1.54)
Bangalore - rural	200 (8.34)	1100 (45.84)	1100 (45.84)	50 (100)	0(0)	0(0)	50 (40)	0(0)	75 (60)	0(0)	0(0)	50 (100)	2625 (1.8)
Belgaum	200 (18.19)	450 (40.91)	450 (40.91)	400 (23.53)	800 (47.06)	500 (29.42)	1000 (45.46)	500 (22.73)	700 (31.82)	500 (100)	0(0)	0(0)	5500 (3.77)
Bellary	500 (16.67)	1500 (50)	1000 (33.34)	50 (28.58)	75 (42.86)	50 (28.58)	100 (40)	50 (20)	100 (40)	500 (100)	0(0)	0(0)	3925 (2.69)
Bidar	1200 (25.54)	2500 (53.2)	1000 (21.28)	600 (11.89)	2950 (58.42)	1500 (29.71)	1000 (52.64)	300 (15.79)	600 (31.58)	500 (90.91)	0(0)	50 (9.1)	12200 (8.35)
Bijapur	1000 (9.53)	5500 (52.39)	4000 (38.1)	100 (8.34)	500 (41.67)	600 (50)	1000 (52.64)	400 (21.06)	500 (26.32)	700 (100)	0(0)	0(0)	14300 (9.79)
Chamarajanagar	0(0)	1100 (50)	1100 (50)	600 (21.24)	1725 (61.07)	500 (17.7)	400 (61.54)	50 (7.7)	200 (30.77)	0(0)	0(0)	0(0)	5675 (3.89)
Chickballapur	400 (8)	2300 (46)	2300 (46)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (100)	5050 (3.46)
Chikmagalur	0(0)	0(0)	0(0)	300 (22.23)	750 (55.56)	300 (22.23)	400 (61.54)	5 (0.7.7)	200 (30.77)	50 (33.34)	0(0)	100 (66.67)	2150 (1.48)
Chitradurga	900 (15.52)	2450 (42.25)	2450 (42.25)	50 (22.23)	75 (33.34)	100 (44.45)	400 (61.54)	50 (7.7)	200 (30.77)	250 (71.43)	0(0)	100 (28.58)	7025 (4.81)
Dakshina Kannada	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (50)	50 (50)	0(0)	0(0)	0(0)	100 (0.07)
Davanagere	200 (20)	400 (40)	400 (40)	50 (13.34)	175 (46.67)	150 (40)	200 (44.45)	100 (22.23)	150 (33.34)	0(0)	0(0)	100 (100)	1925 (1.32)
Dharwad	50 (11.12)	200 (44.45)	200 (44.45)	300 (25)	400 (33.34)	500 (41.67)	1000 (40.41)	500 (20.21)	975 (39.4)	600 (100)	0(0)	0(0)	4725 (3.24)
Gadag	300 (75)	50 (12.5)	50 (12.5)	0(0)	0(0)	0(0)	1000 (41.67)	500 (20.84)	900 (37.5)	600 (100)	0(0)	0(0)	3400 (2.33)
Gulbarga	1300 (11.02)	5500 (46.62)	5000 (42.38)	600 (9.92)	2850 (47.11)	2600 (42.98)	1000 (41.67)	500 (20.84)	900 (37.5)	750 (100)	0(0)	0(0)	2100 (14.37)
Hassan	0(0)	200 (50)	200 (50)	400 (28.58)	800 (57.15)	200 (14.29)	500 (43.48)	250 (21.74)	400 (34.79)	0(0)	0(0)	200 (100)	3150 (2.16)
Haveri	0(0)	175 (50)	175 (50)	0(0)	125 (55.56)	100 (44.45)	100 (33.34)	100 (33.34)	100 (33.34)	0(0)	0(0)	0(0)	875 (0.6)
Kodagu	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Kolar	200 (4.88)	1950 (47.57)	1950 (47.57)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (100)	4150 (2.84)
Koppal	400 (23.53)	650 (38.24)	650 (38.24)	0(0)	325 (61.91)	200 (38.1)	1000 (52.64)	500 (26.32)	400 (21.06)	400 (100)	0(0)	0(0)	4525 (3.1)
Mandya	0(0)	600 (50)	600 (50)	50 (9.53)	375 (71.43)	100 (19.05)	100 (25)	100 (25)	200 (50)	0(0)	0(0)	100 (100)	2225 (1.53)
Mysore	200 (10)	900 (45)	900 (45)	600 (25)	1600 (66.67)	200 (8.34)	400 (50)	100 (12.5)	300 (37.5)	0(0)	0(0)	200 (100)	5400 (3.7)
Raichur	950 (12.76)	5000 (67.12)	1500 (20.14)	0(0)	0(0)	0(0)	300 (66.67)	50 (11.12)	100 (22.23)	400 (100)	0(0)	0(0)	8300 (5.68)
Ramanagara	200 (10)	900 (45)	900 (45)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (100)	0(0)	0(0)	100 (100)	2150 (1.48)
Shimoga	0(0)	0(0)	0(0)	50 (100)	0(0)	0(0)	50 (18.19)	75 (27.28)	150 (54.55)	0(0)	0(0)	0(0)	325 (0.23)
Tumkur	400 (8.43)	2175 (45.79)	2175 (45.79)	400 (29.63)	750 (55.56)	200 (14.82)	500 (31.25)	400 (25)	700 (43.75)	0(0)	0(0)	100 (100)	7800 (5.34)
Udupi	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (100)	0(0)	0(0)	0(0)	50 (0.04)
Uttara kannada	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	50 (100)	0(0)	0(0)	0(0)	0(0)	50 (0.04)
Yadgir	1050 (17.36)	3000 (49.59)	2000 (33.06)	400 (22.86)	1050 (60)	300 (17.15)	1000 (54.06)	400 (21.63)	450 (24.33)	300 (100)	0(0)	0(0)	995 (6.81)
State total	10000 (12.05)	41000 (49.4)	32000 (38.56)	5000 (17.46)	15500 (54.11)	8150 (28.45)	12500 (45.88)	5600 (20.56)	9150 (33.58)	6050 (83.45)	0(0)	1200 (16.56)	146150 (100)

Source: Department of Agriculture, GoK