

Performance Evaluation of Farm Mechanization Scheme in Karnataka

**Scheme implemented by Government of
Karnataka
Final Report**



**Submitted By
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A study team set up for evaluation of “Performance Evaluation of Farm Mechanization Scheme in Karnataka” acknowledges a co-operation received from farmers (Beneficiaries, non-beneficiaries and control) across the state who spared their valuable time and shared their experience with the scheme. The information so shared by them has been an invaluable component of this report.

The team acknowledges with thanks the efforts of all the Co-PI's, Research associates and field investigators who under took the task of collecting qualitative data from 1500 farmers in ten districts across the state.

The Joint Directors of Agriculture at district level in all the ten district of State and officials of the Department of Agriculture, Government of Karnataka have cooperated with the team members in providing information about the operation of the scheme. The team acknowledges with thanks the help and co-operation received from them. Team also express gratitude to the officials of RSK and Agro-Industries (Manufacturers) of various machineries who shared with us the data on the scheme in the initial stage of study.

The team express its thanks to the State Department of Agriculture, Government of Karnataka for providing an opportunity to undertake the evaluation of PEFM scheme in Karnataka.

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Study team

Core Team

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8. Mr. Devendra. B - Assistant professor of Agril. Economics
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Project staff

1. Ravindra Chavan - Senior Research Fellow
2. Manjushree Hiremath - Senior Research Fellow
3. Savitha. R - Senior Research Fellow
4. MahammadrafikNadaf - Senior Research Fellow
5. Raghavendra D. V. - Research Scholar
6. Yasmeen - Research Scholar

The study team supported by four Senior Research Fellow, Research Scholar two and nine field investigators involved in interviewing the beneficiary as per pre-tested schedules and collected the secondary level data from selected taluka, district and state level and also discussed with the officials of respective Raitha Samparka Kendra (RSK). Team designed all type of questions after pre-testing the schedule in the field and submitted to Commissionerate of Agriculture for approval. Based on suggestions from Commissionerate of Agriculture, the schedules were finalized by incorporating the suggestions made by the Commissionerate of Agriculture.

Executive summary

Farm mechanization is an important element of modernization of agriculture. Farm productivity is positively correlated with the availability of farm power coupled with efficient farm implements and their judicious utilization. Agricultural mechanization not only enables efficient utilization of various inputs such as seeds, fertilizers, plant protection chemicals and water for irrigation but also it helps in poverty alleviation by making farming an attractive enterprise. The Department of Agriculture and Cooperation is following multi-pronged strategy for promoting Farm Mechanization.

Farm mechanization is vital for increasing the efficiency of agricultural operations, reducing the cost of production and improving the farm economics. It also comes in handy in reducing the drudgery of farm work when the farm labour is becoming increasingly scarce. In recognition of these advantages a Centrally Sponsored Scheme for Farm Mechanisation was introduced in the year 2001-02. It provided for 25 per cent subsidy. In the year 2002-03 the State Government has hiked the subsidy to 50 per cent by contributing 25 per cent as its share.

The scheme acquired popularity, because of increasing demand, even if the central grants are exhausted, the state continues to support the 50 per cent subsidy from its own resources. Farm Mechanisation Scheme has since become an integral part of *Rashtriya Krishi Vikasa Yojana* (RKVY) and is implemented in Mission mode. Under this arrangement, 50 per cent of the cost is provided as subsidy for buying farm implements whose cost is less than Rs. 5.00 lakhs and 40 per cent subsidy if the cost is more. However, 90 per cent subsidy is provided to the Scheduled Caste/ Scheduled Tribe farmers. During the year 2011-12, an amount of Rs. 12717.28 lakhs was spent on these subsidies.

Objectives

1. To examine the nature, distribution and socio-economic dimensions of beneficiaries under farm mechanization scheme
2. To study the adoption and utilization of machineries by beneficiaries
3. To analyze economics of use of different farm machineries in terms of labour, productivity, production and farm resource use and their efficiency.

4. To assess the impact of farm mechanization at farm level as well as state level in terms of production, productivity, income and employment in farming households in general and SC/ST and small / marginal farmers in particular.
5. To make demand/need/requirement analysis of different farm machineries in different districts
6. To identify the socio-economic and technical constraints in adoption and utilization of farm machineries by beneficiary farmers and implementation of scheme by other stake holders like machinery manufacturers, officials, etc.
7. To suggest measures for making the scheme much more effective.

The results of the present study would be useful in finding out the facts in the existing situations in the selected regions about mechanization and its impact on income and employment in agriculture. It would help to save a farmer's time, labour charges and somehow increase in productivity. Also help the planners and policy makers in identifying the problems in the mechanization of farms and to find out possible remedies for the same.

This study is conducted in seven agro climatic zones of the State *viz.*, North Eastern Transitional zone, North Eastern Dry zone, Northern Dry zone, Central Dry zone, Southern Dry zone, Eastern Dry zone, and part of hilly zone. The data for the study have been collected for the year 2011-12 and 2012-13 from three categories of farmers. Further the data were collected by paying visits to the farmers and the particulars were obtained. Since, there is a variability in agro climatic zones to other zone the adoptability/ usage practices of machineries were changed.

The source of data is a primary source from beneficiaries, non beneficiaries and control and secondary sources from official levels. All the data were generated by personal interview with the respondent beneficiaries, non-beneficiaries and control and detailed discussion with officials at taluka, district and State level, manufacturers and distributors.

The data collected through these investigations were analyzed on the computer and compiled in simple tabular form. The statistical tools, such as the total numbers, averages, percentages, ratios and Garrett Ranking were used to arrive at the desired results.

Findings of the study

1. Utilization of machineries among the beneficiary farmers was more as compared to non- beneficiary farmers with regard to leveller blade utilization among the beneficiary was 72.24 hours higher as compared in non-beneficiaries was 68.97 hours. In case of power tiller utilization among the beneficiary was 91.88 hours marginally higher as compared to non-beneficiaries it was 89.46 hours, similarly in utilization of blade harrow he beneficiary was 132.12 hours as compared to non-beneficiaries was 130.20 hours, with regard to disc harrow 83.29 hours by beneficiary farmers and 74.48 hours by non-beneficiary farmers, in case of mould board plough utilized by beneficiary were 167.42 hours much higher as compared to non-beneficiaries it was 140.64 hour.
2. The machineries utilised efficiently by SC/ST and other category farmers efficiently on their own.
3. The crop productivity was higher on the farms of beneficiary farmers as compared to the control farmers, by using cage wheel in case of paddy crop where in the productivity was higher in beneficiary farmers (29.65 qt/acre) as compared to control farmers (28.33 qt/acre), where as in case of leveler blade usage the productivity of onion crop was 121.06 qt/acre was higher in beneficiary farmers as compared to control farmers 95.50 qt/acre.
4. The income generated by the usage of power tiller was high among beneficiary farmers (Rs. 1,20,643 per year) as compared to non-beneficiary farmers (Rs.98,182 per year), where as in usage of cultivator Rs.78,125 per year higher as compared to non-beneficiary farmers Rs.59,113 per year, similarly in usage of M B Plough beneficiary farmers was (Rs. 65,204 per year) relatively higher income generated as compared to non-beneficiary farmers (Rs. 50,821 per year).
5. Non availability of spare parts in the local market for implements supplied under the machinery under subsidy (Table 226, 229, 232, 235, 238, 241, 244, 247, 250, 253, 256, 259, 262).
6. Farmers are facing difficulty in adjusting margin money while procuring the farm machinery under subsidy (Table 228, 231, 234, 237, 240, 243, 246, 249, 252, 255, 258, 261, 264).

I. INTRODUCTION

Farm mechanization is an important element of modernization of agriculture. Farm productivity is positively correlated with the availability of farm power coupled with efficient farm implements and their judicious utilization. Agricultural mechanization not only enables efficient utilization of various inputs such as seeds, fertilizers, plant protection chemicals and water for irrigation but also it helps in poverty alleviation by making farming an attractive enterprise. The Department of Agriculture and Cooperation is following multi-pronged strategy for promoting Farm Mechanization.

Farm mechanization is vital for increasing the efficiency of agricultural operations, reducing the cost of production and improving the farm economics. It also comes in handy in reducing the drudgery of farm work when the farm labour is becoming increasingly scarce. In recognition of these advantages a Centrally Sponsored Scheme for Farm Mechanisation was introduced in the year 2001-02. It provided for 25 per cent subsidy. In the year 2002-03 the State Government has hiked the subsidy to 50 per cent by contributing 25 per cent as its share.

The scheme acquired popularity, because of increasing demand, even if the central grants are exhausted, the state continues to support the 50 per cent subsidy from its own resources. Farm Mechanisation Scheme has since become an integral part of *Rashtriya Krishi Vikasa Yojana* (RKVY) and is implemented in Mission mode. Under this arrangement, 50 per cent of the cost is provided as subsidy for buying farm implements whose cost is less than Rs. 5.00 lakhs and 40 per cent subsidy if the cost is more. However, 90 per cent subsidy is provided to the Scheduled Caste/ Scheduled Tribe farmers. During the year 2011-12, an amount of Rs. 12717.28 lakhs was spent on these subsidies.

Importance of Farm Mechanization

In underdeveloped countries the per acre yield is low because our farmer is not using the machines and technology in the agricultural operation. Keeping in view the performance of farm mechanization, most of the developing countries have decided to provide loans to the farmers for the purchase of tractors and tube-wells. The use of machines like tractor and bulldozers will enable the farmers to bring more area under

cultivation. A large area of barren land can be cultivated more easily. Tractor and Trolley is also used for transferring the agriculture product from one place to another. A huge amount of product is wasted due to non availability of transport. The use of machinery decreased the cost of production and due to this income of the farmer increase. It also improve the quality of production. The use of machinery saves the time of the farmers which can be utilized for other purpose. More acre of land can be cultivated with tractor in few hours.

Objectives

1. To examine the nature, distribution and socio-economic dimensions of beneficiaries under farm mechanization scheme
2. To study the adoption and utilization of machineries by beneficiaries
3. To analyze economics of use of different farm machineries in terms of labour, productivity, production and farm resource use and their efficiency.
4. To assess the impact of farm mechanization at farm level as well as state level in terms of production, productivity, income and employment in farming households in general and SC/ST and small / marginal farmers in particular.
5. To make demand/need/requirement analysis of different farm machineries in different districts
6. To identify the socio-economic and technical constraints in adoption and utilization of farm machineries by beneficiary farmers and implementation of scheme by other stake holders like machinery manufacturers, officials, etc.
7. To suggest measures for making the scheme much more effective.

Scope of the study

The results of the present study would be useful in finding out the facts in the existing situations in the selected regions about mechanization and its impact on income and employment in agriculture. It would help to save a farmer's time, labour charges and somehow increase in productivity. Also help the planners and policy makers in identifying the problems in the mechanization of farms and to find out possible remedies for the same.

II. METHODOLOGY

The Farm Mechanizations is implemented in the ten districts of Karnataka State, However as per the stipulation put in by the Commissionerate of Agriculture, the study covered ten districts namely Bagalkot, Bijapur, Belgaum, Chikkaballapur, Chitradurga, Gulbarga, Koppal, Mysore, Raichur and Tumkur districts.

Sample and sampling design

The source of data is a primary source from beneficiaries, non beneficiaries and Control and secondary sources from official levels. All the data were generated by personal interview with the respondent beneficiaries, non-beneficiaries and Control and detail discussion with officials at taluka, district and State level, manufacturers and distributors.

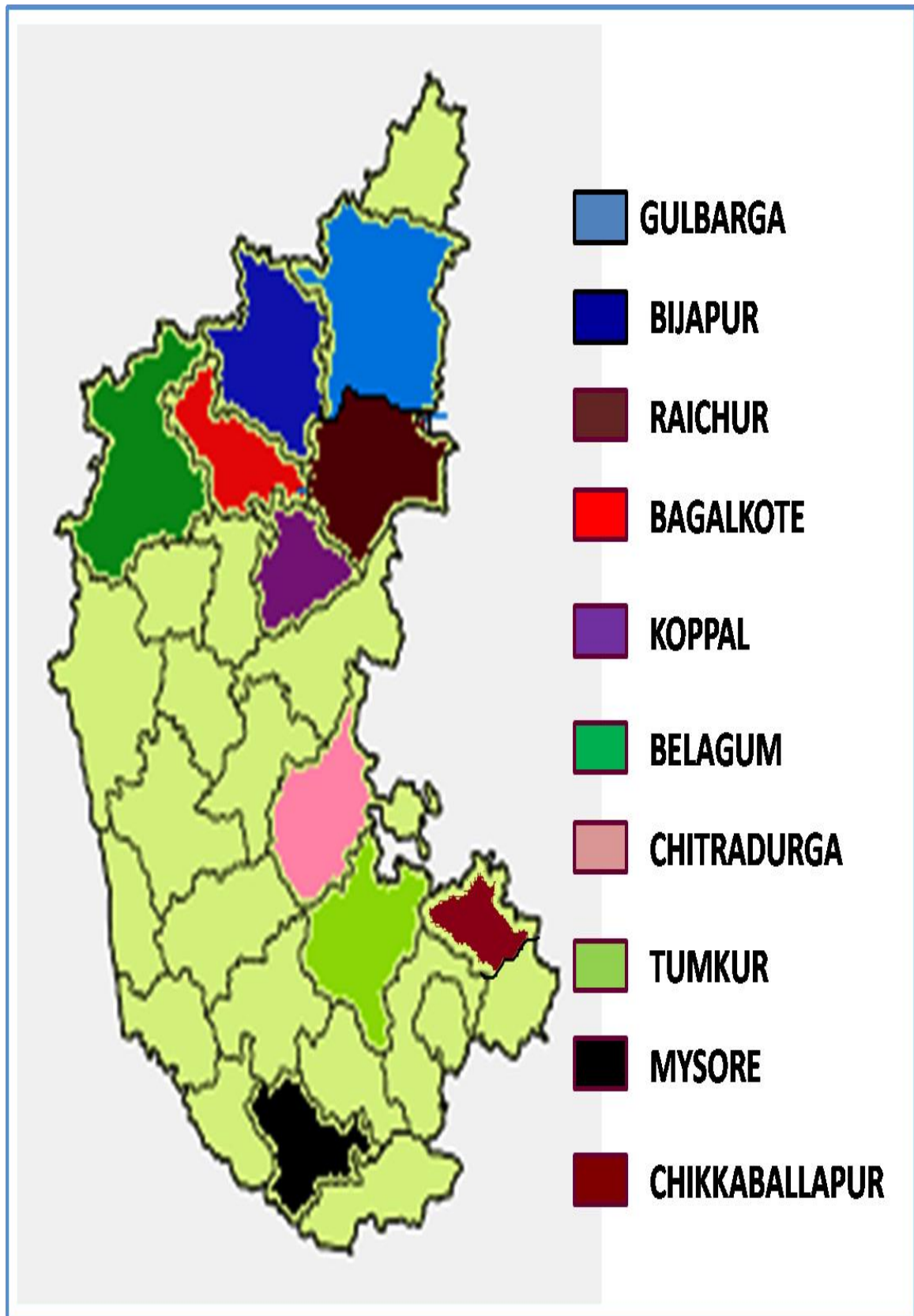
For interviewing the beneficiaries, the detailed schedules designed considering the terms of reference and objectives of the study as also for taluka and districts level. These schedules were canvassed among the beneficiaries, non-beneficiaries and Control taluka and districts followed by discussion and data generated were analyzed for report preparation.

Sample design covers ten districts representing seven agro climatic zones of the State viz., North Eastern Transitional zone, North Eastern Dry zone, Northern Dry zone, Central Dry zone, Southern Dry zone, Eastern Dry zone, and part of hilly zone. The district wise machinery wise sampling details is given in Table 1.

The ten districts covered were namely Bagalkot, Bijapur Belgaum, Chikkaballapur, Chitradurga, Gulbarga, Koppal, Mysore, Raichur, and Tumkur. Based on the expenditure pattern and distribution of machineries in these districts, three talukas each from ten districts were selected based on the maximum expenditure incurred/ maximum physical targets achieved depending upon the type of implements/equipments distributed to the farmers and these selected talukas that represented different soil types and development of irrigation infrastructure (Table 2). From the selected talukas, 5 villages which received maximum benefits during 2011-12 and 2012-13 were selected and the beneficiaries were interviewed for assessing the awareness regarding Farm Mechanization Scheme.

Table.1 The district wise machinery wise sampling details

Sl. No.	District	Bagalkot	Belgaum	Bijapur	Chikkaballapur	Chitradurga	Gulbarga	Koppal	Mysore	Raichur	Tumkur	Total
	FM											
1	Power tiller								39	08	42	90
2	Mould Board Plough	13	63	15								90
3	Rotavator	18	66		07							90
4	Disc harrow		42		22	26						90
5	Cultivators				35	33				22		90
6	Leveller blade	11	49									60
7	Cage wheel							18		42		60
8	Blade harrow					62				16	12	90
9	Seedcum fertilizer drill					14		18		28		60
10	P.P equipments		38	23						30		90
11	Multi crop thresher						24			32	34	90
12	Chaff Cutter		81		05				05			90
13	Diesel pump sets		25	51			13					90
	Total SBF	42	363	89	68	134	37	36	44	178	88	1080
	Without	15	131	32	25	49	13	13	16	64	32	390
	Pure-control	3	3	3	3	3	3	3	3	3	3	30
	Total	60	497	124	96	186	54	53	63	245	123	1500



The map showing the selected districts for the farm mechanization project

Table 2. Data collected from selected talukas

Districts	Talukas
Bijapur	Bijapur
	Sindhagi
	Indi
Bagalkot	Jamakhandi
	Hungund
	Bilagi
Belgaum	Hukeri
	Belgaum
	Savadati
Chitradurga	Chitradurga
	Hiriyur
	Holkere
Chikkaballapur	Sidlaghatta
	Chikkaballapur
	Gauribidanur
Gulbarga	Gulbarga
	Afzalpur
	Jevargi
Koppal	Gangavati
	Koppal
	Yalburga
Mysore	Hunasuru
	T.narsipur
	K.r.nagar
Raichur	Manvi
	Raichur
	Lingasuru
Tumkur	Sira
	Madhugiri
	Tumkur



Survey team discussion with farmer about the maintenance of Seedcum fertilizer drill



Survey team discussion with farmer about the operation of power tiller



Survey team discussion with farmer about the operation of blade harrow



Survey team discussion with farmer about the operation of disc harrow



Survey team discussion with farmer about the operation of cultivator



Survey team discussion with farmer about the operation of cultivator



Survey team discussion with farmer about the operation of spring cultivator



Core Team discussing regarding the findings of the project

III. RESULTS AND DISCUSSION

Machinery-wise production, productivity, income and employment in farming households in beneficiary farmers and non-beneficiary farmers is discussed in the following paragraphs.

1. Power tiller

1.1 Labour usage pattern generated by using 'Power tiller' among sample farmers in Karnataka

Table 193 depicts the average labour usage pattern generated by using power tiller. under SC/ ST category beneficiary farmers in 2011-12 was 22.89 (Rs.4,659) man days which was relatively higher compared to non-beneficiaries SC/ST farmers (21.19 man days). However, in other category the trend was reverse that is the employment generated by beneficiaries farmers was 19.55 man days (Rs.4,247) as compared to non-beneficiary farmers (23.86 man days) which was due to hiring out of power tiller more in non-beneficiaries as compared to beneficiary farmers. The number of hour of utilisation was also more in non-beneficiary farmers. It is important to note that the beneficiaries SC/ST and other farmer utilised power tiller sufficiently for their own purpose.

Employment generated was relatively higher during 2012-13 in both SC/ST and other farmers compared to previous year (2011-12). The employment generation in SC/ST category and other beneficiaries farmer were 25.24 (Rs. 5,270) and 22.97 (Rs.4, 880) man days, respectively.

1.2 Annual income generation by usage of 'Power tiller' among sample farmers in Karnataka

The annual income generated by use of power tiller among sample farmers in Karnataka is presented in Table 194. As evident from the table that, the total annual income in the year 2011-12 was Rs. 1,04,022 and Rs, 90,541 for SC/ST and other category farmers respectively. Whereas in non-beneficiaries total net annual income generated by SC/ST and other farmers were Rs. 98,182 and Rs. 1, 09,850 respectively. However, the total net income generated by the SC/ST and others beneficiaries were Rs.1, 20,643 and Rs. 1, 09,771 respectively. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 5.61 and - 21.33 per cent respectively.

1.3 Crop production from different category among sample farmers by purchase of ‘Power tiller’ in Karnataka

Table 195 depicts crop production among sample farmers by purchase of power tiller in Karnataka. The yield realized by SC/ST category farmers for different crops like ragi, groundnut and cotton were 7.80, 8.50 and 8.92 qt/ac respectively. Whereas, yield realized in case of other category beneficiary farmers for different crop produce were 7.89, 8.35 and 8.90 qt/acre reported to be higher as compared to control farmers, this was mainly due to timeliness of operations like land preparation and inter cultivation by purchase of power tiller under farm mechanization scheme. Pathak *et, al.* (1978) conducted survey on five different categories of farms in Ludhiana district of Punjab to assess the effect of power sources on production and productivity. The yield of paddy, maize and wheat was reported to be higher on tractor farms than on bullock farms. The present study also confirmed higher productivity among beneficiary farmers compared to non-beneficiary and control farmers. The highest percentage change in production was seen in the groundnut crop *i.e* 1.48 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.193 Labour usage pattern generated by using ‘Power tiller’ among sample farmers in Karnataka

(Per year)

Sl. No.	Category	2011-12 Beneficiaries		Non-Beneficiaries	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	22.89	4659	21.19	4370
2	Others	19.55	4247	23.86	5095
Sl. No.		2012-13 Beneficiaries			
1	SC/ST	25.24	5270		
2	Others	22.97	4880		

Note : MD- Man days

Table.194 Annual income generation by usage of ‘Power tiller’ among sample farmers in Karnataka

Sl. No.	2011-12 Beneficiaries				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	118433	14411	104022	5.61	110947	12764	98182
	Others	103058	12518	90541	-21.33	125576	15726	109850
Sl. No.	2012-13 Beneficiaries							
1	SC/ST	136617	15973	120643	18.62			
	Others	125168	15397	109771	-0.07			

Table.195 Crop production from different category sample farmers by purchase of ‘Power tiller’ in Karnataka (qt/ac)

Sl. No	Crop	Beneficiaries			Non-beneficiaries (n=32)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over control
		SC/ST (n=31)	Others (n=58)	Average				
1	Arecanut	6.28	6.35	6.32	6.40	-1.35	-	-
2	Coconut (no.)	4085.50	4093.46	4089.48	4088.35	0.03	-	-
3	Paddy	29.40	29.48	29.44	29.45	-0.03	-	-
4	Ragi	7.80	7.89	7.85	7.75	1.21	6.85	12.68
5	Groundnut	8.50	8.35	8.43	8.30	1.48	8.10	3.86
6	Cotton	8.92	8.90	8.91	8.85	0.67	7.20	19.19
7	Mango	56.30	56.50	56.40	56.73	-0.59	-	-

2. CULTIVATOR

2.1 Labour usage pattern generated by using ‘Cultivator’ among sample farmers in Karnataka

The average Labour usage pattern generated by using cultivator is presented in Table 196. SC/ ST category beneficiary farmers during 2011-12 was 28.05 (Rs.5,758) man days which was relatively higher in non-beneficiary SC/ST category farmers (29.50 man days). However, in other category the trend was reverse the employment generated beneficiaries farmers was 26.04 man days (Rs.5,403) as compared to non-beneficiaries farmers (32.01 man days) because of hiring out of cultivator more in non-beneficiaries as compared to beneficiary farmers. The number of hour of utilisation was also more in non-beneficiaries farmers. It is important to note that, the beneficiaries SC/ST and other category farmers’ utilised cultivator sufficiently for their own purpose.

Employment generated was relatively higher during 2012-13 in both SC/ST and other farmers compared to previous year(2011-12). The employment generation in SC/ST category and other beneficiaries farmer were 26.19 (Rs. 5,459) and 24.69 (Rs.5, 161) man days, respectively.

2.2 Annual income generation by usage of ‘Cultivator’ among sample farmers in Karnataka

Table 197 depicts the annual income generated by use of cultivator among sample farmers in Karnataka. As shown in the table that, the total annual income in the year 2011-12 was Rs. 84,682 and Rs, 78,125 for SC/ST and other category farmers respectively. Whereas in non-beneficiaries total net annual income generated by SC/ST and other farmers were Rs. 55,958 and Rs. 59,113 respectively. However, the total net income generated by the SC/ST and others beneficiaries were Rs. 79,253 and Rs. 75,349 respectively. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 33.92 and 24.34 per cent respectively.

2.3 Crop production from different category among sample farmers by purchase of ‘Cultivator’ in Karnataka

The average production of different crops in beneficiaries and non- beneficiaries farmers land was comparatively higher to that of control farmers who did not use any machinery on their land (Table 198). The per acre average production of crops on the farms of farmers who used the machinery was 7 qt per acre in Ragi, 7 qt per acre in groundnut, 3 qt

in sunflower, 8 qt in cotton, 19 qt in maize, 124 qt/acre in tomato, 5 qt /acre in jowar, 4 qt /acre in red gram, 87 qt /acre in carrot, 62 qt /acre in cauliflower & 4 qt /acre in bengalgram which was higher compared to the control farmers. On the farms of control farmers who did not use any machinery on farm the average annual production was 6.50 qt /acre in ragi, 3.08 qt /acre in sunflower, 7.86 qt /acre in cotton, 4.97 qt /acre in jowar, 4.09 qt /acre in redgram and 3.84 qt /acre in bengalgram which was lower than the beneficiary and non-beneficiary farmers lands who used machinery on their land. The highest percentage change in production was seen in the redgram crop *i.e* 2.33 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.196 Labour usage pattern generated by using ‘Cultivator’ among sample farmers in Karnataka (Per year)

Sl. No.	Category	2011-12 Beneficiaries (n=38)		Non-Beneficiaries (n=38)	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	28.05	5758	29.50	6033
2	Others	26.04	5403	32.01	6514
Sl. No.		2012-13 Beneficiaries (n=52)			
1	SC/ST	26.19	5459		
2	Others	24.69	5161		

Table.197 Annual income generation by usage of ‘Cultivator’ among sample farmers in Karnataka

(Rs. /year)								
Sl. No.	2011-12 Beneficiaries (n=38)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=38)		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	101083	16401	84682	33.92	112006	56048	55958
2	Others	93839	15714	78125	24.34	120972	61860	59113
Sl. No.	2012-13 Beneficiaries (n=52)							
1	SC/ST	95637	16383	79253	29.39			
2	Others	91263	15914	75349	21.55			

Table.198 Crop production from different category sample farmers in Karnataka (qt/acre)

Sl. no.	Crop	Beneficiaries		Average	Non-beneficiaries (n=38)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over non-beneficiaries
		SC/ST (n=34)	Others (n=56)					
1	Mulberry	284.35	284.50	284.43	285.03	-0.21	283.50	0.33
2	Ragi	7.79	7.81	7.80	7.75	0.64	6.50	16.67
3	Groundnut	7.24	7.35	7.30	7.60	-4.18	--	--
4	Sunflower	3.40	3.50	3.45	3.72	-7.83	3.08	10.72
5	Onion	--	110.50	110.50	--	--	--	--
6	Cotton	8.30	8.15	8.23	8.24	-0.18	7.86	4.44
7	Maize	19.35	19.70	19.53	19.64	-0.59	--	--
8	Tomato	124.35	124.50	124.43	124.30	0.10	--	--
9	Jowar	5.67	5.74	5.71	5.80	-1.67	4.97	12.88
10	Redgram	4.46	4.55	4.51	4.40	2.33	4.09	9.21
11	Carrot	87.53	87.50	87.52	87.50	0.02	--	--
12	Cauliflower	62.58	62.04	62.31	62.50	-0.30	--	--
13	Bengalgram	4.42	4.35	4.39	4.50	-2.62	3.84	12.43

3. CAGE WHEEL

3.1 Labour usage pattern generated by using “Cage Wheel’ among sample farmers in Karnataka

The average labour usage pattern generated under SC/ ST category beneficiary farmers by using cage wheel in 2011-12 was 5.73 (Rs.1,289) man days which was relatively lower in non-beneficiaries SC/ST farmers was 6.19 man days (Table 199). However, in other category the trend was reverse the employment generated beneficiaries farmers was 7.62 man days (Rs.1,596) as compared to non-beneficiaries farmers (7.99 man days) this was due of hiring out of cage wheel more in non-beneficiaries as compared to beneficiary farmers. The number hour utilisation was also more in non-beneficiaries farmers. It is important to note that the beneficiaries SC/ST and general farmer utilised cage wheel sufficiently for their own purpose.

Employment generated was relatively higher 2012-13 in SC/ST farmers compared to previous year (2011-12). The employment generation in SC/ST category farmer were 25.24 (Rs. 5,279) man days, respectively.

3.2 Annual income generation by usage of ‘Cage Wheel’ among sample farmers in Karnataka

Table 200 depicts the annual income generated by use of cage wheel among sample farmers in Karnataka. As revealed from the table that, the total annual income in the year 2011-12 was Rs. 16,892 and Rs, 21,929 for SC/ST and other category farmers respectively. Whereas in non-beneficiaries total net annual income generated by SC/ST and other farmers were Rs. 15,349 and Rs. 20,778 respectively. However, the total net income generated by the SC/ST and others beneficiaries during 2012-13 was Rs.22, 894 and Rs. 19,942 respectively. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 9.13 and 5.25 per cent respectively.

3.3 Crop production from different category among sample farmers by purchase of ‘Cage Wheel’ in Karnataka

Crop production among sample farmers by purchase of cage wheel in Karnataka is presented in Table 201. The realized by SC/ST category farmers production of paddy was 29.63 qt/ac respectively. Whereas, yield realized was others category beneficiary farmers was 29.66 qt are reported to be higher as compared to control farmers (28.33 qt), this was

mainly due to timeliness of operations cultivation by purchase of cage wheel under farm mechanization scheme. Pathak *et al.* (1978) conducted survey on five different categories of farms in Ludhiana District of Punjab to assess the effect of power sources on production and productivity. The yield of paddy, maize and wheat was reported to be higher on tractor farms than on bullock farms. The present study also confirmed higher productivity among beneficiary farmers compared to non-beneficiary and control farmers. The percentage change in production was seen in the paddy crop was found to be negative at 0.12 per cent with respect to the beneficiaries over non-beneficiaries. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.199 Labour usage pattern generated by using ‘Cage wheel’ among sample farmers in Karnataka

(Per year)					
Sl. No.	Category	2011-12 Beneficiaries (n=26)		Non-Beneficiaries (n=29)	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	5.73	1289	6.19	1393
2	General	7.62	1596	7.99	1727
Sl. No.		2012-13 Beneficiaries (n=34)			
1	SC/ST	8.29	1727		
2	General	7.46	1579		

Note : MD- Man days

Table.200 Annual income generated due to usage of ‘Cage wheel’ among sample farmers in Karnataka (Rs./ year)

Sl. No.	2011-12 Beneficiaries (n=26)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=29)		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	29257	12365	16892	9.13	35397	20048	15349
	Other	26586	16657	21929	5.25	41263	20605	20778
Sl. No.	2012-13 Beneficiaries (n=34)							
1	SC/ST	44607	21713	22894	32.96			
	Other	26345	18583	19942	-4.19			

Table.201 Crop production from different category among sample farmers in Karnataka (qt/acre)

Sl. No	Crop	Beneficiaries			Non-Beneficiaries (n=29)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over control
		SC/ST (n=11)	General (n=49)	Average				
1	Paddy	29.63	29.66	29.65	29.68	-0.12	28.33	4.44

4. DIESEL PUMPSET

4.1 Annual income generation by usage of ‘Diesel Pumpset’ set’ among sample farmers in Karnataka

The annual income generated by the usage of diesel pumpset among sample farmers in Karnataka is presented in Table 202. It's evident from the table that the total annual net income in the year 2011-12 was Rs. 15,811 and Rs. 15,289 for SC/ST and other category farmers respectively. Similarly in case of beneficiaries in the year 2012-13 for SC/ST and other category farmers were Rs. 16,811 and Rs. 17,589. Whereas, in non-beneficiaries the total net income generated by SC/ST and general beneficiaries were Rs. 19,826 and Rs. 19,041 respectively. The income generation was based on the utilization and its contribution as machinery in providing irrigation. The imputed value was taken for its utilization on own farm and hiring charges for other farmers. There exists difference across beneficiary, non-beneficiary and across different category of farmers which is quite obvious due to variation

in landholding size and efficiency in management of farmers. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be negative 25.39 and 24.54 per cent respectively. This negative was due to larger size landholding of non-beneficiaries who have used efficiency for more number of hours for irrigation.

4.2 Crop production from different category among sample farmers by purchase of 'Diesel Pumpset' in Karnataka

The crop wise productivity of different crops is presented in Table 203. It is clear from the table that the comparable yield levels for almost all crops are available for beneficiary, non-beneficiary and not for control. The available comparable yield levels indicated that the yield levels are marginally higher for beneficiary category compared to control farmers. This was probably due to timely availability of diesel pumpset for irrigation. The timely irrigation at critical stages of crop growth has strong bearing on the productivity. The highest percentage change in production was seen in the soybean *i.e* 6.04 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.202 Annual income generation by usage of 'Diesel pump set' among sample farmers in Karnataka (Rs. per year)

Sl. No.	2011-12 Beneficiaries				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	28481	12670	15811	-25.39	37128	17302	19826
2	Others	28191	12902	15289	-24.54	36105	17064	19041
Sl. No.	2012-13 Beneficiaries							
1	SC/ST	30603	13792	16811	-17.93			
2	Others	30959	13370	17589	-8.25			

Table.203 Crop production from different category among sample farmers in Karnataka

Sl. No	Crop	Beneficiaries			Non-Beneficiaries (n=24)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over non-beneficiaries
		SC/ST (n=27)	Others (n=62)	Average				
1	Redgram	4.97	5.05	5.01	5.03	-0.40	4.17	16.77
2	Sunflower	3.79	3.81	3.8	3.75	1.32	--	--
3	Onion	117.50	117.50	117.5	117.30	0.17	105.00	10.64
4	Chilli	4.50	4.54	4.52	4.60	-1.77	3.87	14.38
5	Brinjal	-	157.50	157.5	--	--	--	--
6	Sugarcane	32.08	32.30	32.19	32.25	-0.19	--	--
7	Grape	139.60	139.50	139.55	139.57	-0.01	--	--
8	Pomogranate	44.35	44.50	44.425	44.30	0.28	--	--
9	Soybean	3.65	3.80	3.725	3.50	6.04	--	--
10	Maize	18.00	18.50	18.25	18.33	-0.44	--	--
11	Bengalgram	4.34	4.45	4.395	4.39	0.11	4.05	7.85
12	Groundnut	7.75	7.83	7.79	7.80	-0.13	7.25	6.93
13	Cotton	8.60	8.64	8.62	8.68	-0.70	7.90	8.35
14	Potato	-	43.45	43.45	43.25	0.46	--	--

5. BLADE HARROW

5.1 Employment generated by using 'Blade Harrow' among sample farmers in Karnataka

Table 204 depicts the average employment generated SC/ ST category beneficiary farmers by using blade harrow in 2011-12 was 16.93 (Rs.3, 466) man days which was relatively higher in non-beneficiaries SC/ST farmers (16.85 man days). However, similar trend was follow in others category sample farmers, employment generated beneficiaries farmers was 16.71 man days (Rs.3,446) as compared to non-beneficiaries farmers (15.59 man days) this was due to hiring out of blade harrow more in beneficiaries as compared to non-beneficiaries farmers. The number of hour of utilisation was also more in beneficiaries' farmers. It is important to note that the beneficiaries SC/ST and others farmer utilised blade harrow sufficiently.

5.2 Annual income generation by usage of ‘Blade Harrow’ among sample farmers in Karnataka

The annual income generated by use of blade harrow among sample farmers in Karnataka is presented in Table 205. As evident from the table that, the total annual income in the year 2011-12 was Rs.54, 610 and Rs, 53,962 for SC/ST and other category farmers relatively higher compare to non-beneficiaries. Whereas in non-beneficiaries total net annual income generated by SC/ST and other farmers were Rs. 54,193 and Rs. 52,853 respectively. However, the total net income generated during 2012-13 by the SC/ST and other beneficiaries were Rs. 52,349 and Rs. 53,825 respectively. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 0.76 and 2.06 per cent respectively.

5.3 Crop production from different category among sample farmers by purchase of ‘Blade Harrow’ in Karnataka

The crop wise productivity of different crops is presented in Table 206. It is clear from the Table that the comparable yield levels for almost all crops are available for beneficiary, non-beneficiary and not for pure control. The available comparable yield levels indicated that the yield levels are marginally higher for beneficiary category compared to control farmers. This was probably due to timely sowing by use machinery on their land as strong bearing on the productivity in beneficiary and non-beneficiary farmers. The highest percentage change in production was seen in the groundnut crop *i.e* 1.68 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.204 Labour usage pattern generated by using ‘Blade harrow’ among sample farmers in Karnataka

(Per year)

Sl. No.	2011-12 Beneficiaries			Non-Beneficiaries	
	Category	Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	16.93	3466	16.85	3475
2	General	16.71	3446	15.59	3230
Sl. No.	2012-13 Beneficiaries				
1	SC/ST	15.07	3109		
2	General	15.79	3265		

Table.205 Annual income generation by using ‘Blade harrow’ among sample farmers in Karnataka

(Rs. / year)

Sl. No.	2011-12 Beneficiaries				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	64467	9857	54610	0.76	63840	9647	54193
	Others	63547	9585	53962	2.06	61348	8494	52853
Sl. No.	2012-13 Beneficiaries							
1	SC/ST	61047	8494	52349	-3.52			
	Others	62950	9125	53825	1.81			

Table.206 Crop production from different category of sample farmers in Karnataka

(qt/acre)

Sl. No	Crop	Beneficiaries		Average	Non-beneficiaries (n=21)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over non-beneficiaries
		SC/ST (n=6)	Others (n=8)					
1	Sugarcane	29.84	29.88	29.86	29.85	0.03	-	
2	Maize	18.50	18.58	18.54	18.46	0.43	17.34	6.47
3	Soyabean	3.88	3.85	3.87	3.80	1.68	-	
4	Chilli	3.65	3.64	3.65	3.65	-0.14	3.08	15.50
5	Potato	43.51	43.55	43.53	43.55	-0.05	42.31	2.80
6	Cabbage	102.40	102.45	102.43	102.40	0.02	-	
7	Cauliflower	64.37	64.31	64.34	64.35	-0.02	-	
8	Onion	121.04	121.17	121.11	121.06	0.04	95.50	21.14

6. PLANT PROTECTION EQUIPMENT

6.1 Labour usage pattern generated by using 'Plant Protection Equipment' among sample farmers in Karnataka

Table 207 depicts the average labour usage pattern generated by using plant protection equipment under SC/ ST category beneficiary farmers in 2011-12 and 2012-13 was 17.11 (Rs.3, 586) and 14.84 (Rs.3,144) man days which was relatively higher compared to non-beneficiaries SC/ST farmers (14.84 man days). However, in other category the trend was reverse and the employment generated in beneficiaries farmers was 15.81 (Rs.3,374) and 15.70 (Rs.3,387) man days as compare to non-beneficiaries farmers (20.54 man days) this was due to hiring out of plant protection equipment more in non-beneficiaries as compared to beneficiaries farmers. The number hour utilisation was also more in non-beneficiaries farmers. It is important to note that the beneficiaries SC/ST and general farmer utilised plant protection equipment sufficiently for their own purpose.

6.2 Annual income generation by usage of ‘Plant Protection Equipment’ among sample farmers in Karnataka

The annual income generated by use of plant protection equipment among sample farmers in Karnataka is presented in Table 208. As evident from the table that, the total annual income in the year 2011-12 was Rs. 14,679 and Rs. 13,126 for SC/ST and general category farmers respectively. Whereas in non-beneficiaries total net annual income generated by SC/ST and other farmers were Rs. 11,310 and Rs. 16,941 respectively.

6.3 Crop production from different category among sample farmers by purchase of ‘Plant Protection Equipment’ in Karnataka

The crop wise productivity of different crops is presented in Table 209. It is clear from the Table that the comparable yield levels for almost all crops are available for beneficiary, non-beneficiary and not for control. The available comparable yield levels indicated that the yield levels are marginally higher for beneficiary category compared to control farmers. This was probably due to reduced infestation from insect and pest by timely spraying of plant protection chemicals by use of plant protection equipment. The highest percentage change in production was seen in the sunflower crop *i.e* 1.20 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.207 Labour usage pattern generated by using ‘P.P. Equipment’ among sample farmers in Karnataka

(Per year)					
Sl. No.	Category	2011-12 Beneficiaries (n=39)		Non-Beneficiaries (n=32)	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	17.11	3586	14.84	3144
2	Others	15.81	3374	20.54	4451
Sl. No.		2012-13 Beneficiaries (n=52)			
1	SC/ST	13.60	2856		
2	Others	15.70	3387		

Table.208 Annual income generation due to usage of ‘P.P. Equipment’ among sample farmers in Karnataka
(Rs./year)

Sl. No.	2011-12 Beneficiaries (n=39)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=32)		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	16536	1857	14679	22.95	13516	2206	11310
2	Others	15378	2253	13126	-29.06	19792	2850	16941
Sl. No.	2012-13 Beneficiaries (n=52)							
1	SC/ST	12430	1860	10570	-7.00			
2	Others	14715	2105	12610	-34.35			

Table.209 Crop production from different category sample farmers in Karnataka

Sl. No	Crop	Beneficiaries			% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=32)	Control (n=9)	% change in beneficiaries over control
		SC/ST (n=39)	Others (n=51)	Average				
1	Grape	138.80	138.65	138.73	0.16	138.50	-	-
2	Sugarcane	28.55	28.20	28.38	-2.03	28.95	--	-
3	Redgram	4.70	4.78	4.74	-0.21	4.75	3.94	16.88
4	Sunflower	3.74	3.79	3.77	1.20	3.72	--	
5	Onion	106.50	106.15	106.33	0.02	106.30	95.50	10.18
6	Bengalgram	4.50	4.60	4.55	-2.86	4.68	3.88	14.73
7	Chilli	3.65	3.68	3.67	-2.05	3.74	3.08	15.96
8	Potato	45.35	45.52	45.44	-0.43	45.63	-	-
9	Soybean	3.45	3.50	3.48	-4.46	3.63	-	-
10	Cotton	8.24	8.26	8.25	0.61	8.20	7.08	14.18

7. LEVELER BLADE

7.1 Labour usage pattern generated by using ‘Leveler Blade’ among sample farmers in Karnataka

Table 210 depicts the average labour usage pattern generated by using leveler blade under SC/ ST category beneficiary farmers in 2011-12 was 10.99 (Rs.2,239) man days which was relatively higher in non-beneficiaries SC/ST farmers (9.36 man days). Similarly, in other category beneficiaries farmers was 10.15 man days (Rs.2,069) as compared to non-beneficiaries farmers (7.69 man days) this was due to hiring out of leveler blade more in beneficiaries as compare to non-beneficiaries farmers.

Employment generated was relatively higher during 2012-13 in both SC/ST farmers compared to previous year (2011-12). The employment generation in SC/ST category farmer were 11.26 (Rs. 2, 325) man days, respectively. It is important to note that, the utilisation was more in SC/ST category farmers compare to others farmers both beneficiaries and non-beneficiaries farmers.

7.2 Annual income generation by usage of ‘Leveler Blade’ among sample farmers in Karnataka

The annual income generated by use of leveler blade among sample farmers in Karnataka is presented in Table 211. As evident from the table that, the total annual income in the year 2011-12 was Rs. 42,452 and Rs, 39,791 for SC/ST and other category farmers respectively. Whereas in non-beneficiaries total net annual income. The percentage change of net income for SC/ST and other Category farmers, beneficiaries over the non-beneficiaries was found to be 5.38 and 16.54 per cent respectively.

7.3 Crop production from different category among sample farmers by purchase of ‘Leveler Blade’ in Karnataka

The crop production from different category sample farmers is presented in Table 212. It is clear from the table that, the comparable yield levels for almost all crops are available for beneficiary, non-beneficiary and not for pure control. The available comparable yield levels indicated that the yield levels are marginally higher for beneficiary category compared to pure control farmers. This was probably due to timely operation.

**Table.210 Labour usage pattern generated by using ‘Leveler blade’ among sample farmers in Karnataka
(Per year)**

Sl. No.	Category	2011-12 Beneficiaries		Non-Beneficiaries	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	10.99	2239	9.36	1923
2	Other	10.15	2069	7.69	1604
Sl. No.		2012-13 Beneficiaries			
1	SC/ST	11.26		2325	
2	Other	9.57		1976	

Table.211 Annual income generation by usage of 'Leveler blade' among sample farmers in Karnataka (Rs. /year)

Sl. No.	2011-12 Beneficiaries (n=6)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=21)		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	49046	6594	42452	5.38	45454	5284	40170
2	Others	45917	6126	39791	16.54	37605	4394	33210
Sl. No.	2012-13 Beneficiaries (n=8)							
1	SC/ST	52498	7048	45449	11.62			
2	Others	48208	6816	41392	19.77			

Table.212 Crop production from different category of sample farmers in Karnataka (qt/acre)

Sl. No	Crop	Beneficiaries			Non-beneficiaries (n=21)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over non-beneficiaries
		SC/ST (n=6)	Others (n=8)	Average				
1	Sugarcane	29.84	29.88	29.86	29.85	0.03	-	-
2	Maize	18.50	18.58	18.54	18.46	0.43	17.34	6.47
3	Soyabean	3.88	3.85	3.865	3.80	1.68	-	-
4	Chilli	3.65	3.64	3.645	3.65	-0.14	3.08	15.50
5	Potato	43.51	43.55	43.53	43.55	-0.05	42.31	2.80
6	Cabbage	102.40	102.45	102.43	102.40	0.02	-	-
7	Cauliflower	64.37	64.31	64.34	64.35	-0.02	-	-
8	Onion	121.04	121.07	121.06	121.06	0.00	95.50	21.11

8. CHAFF CUTTER

8.1 Labour usage pattern generated by using 'Chaff Cutter' among sample farmers in Karnataka

The overall average annual labour usage pattern generated by 2011-12 and 2012-13 of beneficiaries was 14.68 and 12.97 MD respectively whereas the overall average annual employment generated by the non-beneficiary farmers was 15.04 MD. The average annual employment generated by SC/ST farmers was 16.32 and 12.65 MD by 2011-12 and 2012-13 beneficiaries respectively and 14.32 MD by SC/ST non-beneficiary farmers. The value of employment generated by 2011-12 and 2012-13 beneficiaries was Rs. 3376 and Rs. 3372 respectively and Rs. 3684 by non-beneficiary farmers (Table 213).

8.2 Annual income generation by usage of 'Chaff Cutter' among sample farmers in Karnataka

A close perusal of the Table 213 revealed that the average annual net income generated by using Chaff cutter was Rs. 5,157 and Rs. 3,912 for 2011-12 and 2012-13 beneficiaries respectively. The average annual net income generated by SC/ST category by non-beneficiary farmers was Rs.

3844 and by general category non-beneficiary farmers was Rs. 4345. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 25.46 and negative with 7.71 per cent respectively.

Table 213: labour usage pattern by using 'Chaff cutter' among sample farmers in Karnataka (Per Year)

SI. No.	2011-12 Beneficiaries (n=44)			Non-Beneficiaries (n=38)	
	Category	Labour		Labour	
		MD*	Value (Rs.)	MD *	Value (Rs.)
1	SC/ST	16.32	3753.60	14.32	3508.40
2	Others	13.65	3139.50	15.38	3768.10
SI. No.	2012-13 Beneficiaries (n=46)				
1	SC/ST	12.65	3289.00		
2	Others	13.87	3606.20		

Table 213: Annual Income generation by using 'Chaff cutter' among sample farmers in Karnataka

SI. No.	2011-12 Beneficiaries (n=44)				Non-Beneficiaries (n=38)		
	Category	Total gross returns (Rs.)	Total Operation cost (Rs.)	Net income (Rs.)	Total gross returns (Rs.)	Total Operation cost (Rs.)	Total net income (Rs.)
1	SC/ST	9792	4635	5157	8592	4748	3844
2	General	8190	4156	4034	9220	4875	4345
SI. No.	2012-13 Beneficiaries (n=46)						
1	SC/ST	7590	3678	3912			
2	General	8322	4101	4221			

9. DISC HARROW

9.1 Labour usage pattern generated by using 'Disc Harrow' among sample farmers in Karnataka

A close perusal of the Table 214 revealed that, the annual labour usage pattern generated using Disc Harrow was 9.95 MD and 9.26 MD by SC/ST and general category during 2011-12 beneficiaries respectively and for 2012-13 beneficiaries the average annual employment generated was 12.20 MD and 11.23 MD by SC/ST and general category farmers respectively. The value of employment generated for 2011-12 beneficiaries was Rs. 2189 and Rs. 1987 by SC/ST and general category farmers respectively and the value of employment generated by 2012-13 beneficiaries was Rs. 2668 and Rs. 2446 respectively for SC/ST and general category farmers. Further it was observed that the employment generated by non-beneficiary farmers was 10.27 MD and 9.66 MD by SC/ST and general category farmers respectively. This valued to the amount of Rs. 2200 and Rs. 2140 for SC/ST and general category farmers respectively.

9.2 Annual income generation by usage of 'Disc Harrow' among sample farmers in Karnataka

It was observed from the Table 215 that, annual net income generated by using Disc Harrow was Rs. 37,709 and Rs. 35,025 by SC/ST and general category during 2011-12 beneficiaries respectively and Rs.43,729 and Rs. 41,824 by SC/ST and general category for 2012-13 beneficiaries respectively. Whereas the net annual income generated by non-beneficiary farmers was Rs. 38,920 and Rs. 36,052 by SC/ST and general category farmers respectively. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 11.00 and 13.80 per cent respectively.

Table.214 Labour usage pattern generated by using ‘Disc harrow’ among sample farmers in Karnataka

(Per year)

Sl. No.	Category	2011-12 Beneficiaries		Non-Beneficiaries	
		MD	Value	MD	Value
1	SC/ST	9.95	2189	10.27	2200
2	Others	9.26	1982	9.66	2140
Sl. No.		2012-13 Beneficiaries			
1	SC/ST	12.20	2668		
2	Others	11.23	2446		

Note : MD- Man days

Table.215 Annual income generation by usage of ‘Disc harrow’ among sample farmers in Karnataka

(Rs. /year)

Sl. No.	2011-12 Beneficiaries (n=21)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=28)		
	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	45969	8260	37709	-3.21	48552	9632	38920
2	Others	43086	8062	35025	-2.93	45286	9234	36052
2012-13 Beneficiaries (n=29)								
1	SC/ST	54254	10525	43729	11.00			
2	Others	51798	9974	41824	13.80			

9.3 Crop production from different category among sample farmers by purchase of ‘Disc Harrow’ in Karnataka

A close perusal of the Table 216 revealed that, the production of onion was 110.80 qtls/acre for SC/ST beneficiary farmers, 110.38 qtls/acre for general category farmers and 108.24 qtls/acre for non-beneficiary farmers. On an average production of all the crops from beneficiary and non-beneficiary farmers was higher than the control farmers production. The highest percentage change in production was seen in the redgram crop *i.e* 2.65 per cent with respect to the beneficiaries over non-beneficiaries, subsequently with respect beneficiaries over control was

observed in cotton crop. The change in percentage of crop production in beneficiaries over control was highest comparatively to beneficiaries over non beneficiaries.

Table.216 Crop production from different category sample farmers in Karnataka
(qt/acre)

Sl. no.	Crop	Beneficiaries			Non-Beneficiaries (n=28)	% change in beneficiaries over non-beneficiaries	Control (n=9)	% change in beneficiaries over non-beneficiaries
		SC/ST (n=13)	Others (n=37)	Average				
1	Soybean	3.46	3.61	3.54	3.52	0.42	-	-
2	Groundnut	7.13	7.15	7.14	7.18	-0.56	6.84	4.20
3	Grape	134.31	134.35	134.33	134.38	-0.04	-	-
4	Maize	19.83	19.90	19.87	19.91	-0.23	17.53	11.75
5	Ragi	5.27	5.27	5.27	5.25	0.38	4.85	7.97
6	Redgram	4.62	4.81	4.72	4.59	2.65	4.10	13.04
7	Mulbery	291.04	291.17	291.11	291.13	-0.01	-	-
8	Areacanut	5.25	5.31	5.28	5.25	0.57	-	-
11	Sunflower	3.90	3.84	3.87	3.86	0.26	2.14	44.70
12	Bengal gram	4.10	4.12	4.11	4.18	-1.70	3.09	24.82
13	Onion	110.80	110.38	110.59	108.24	2.12	102.72	7.12
14	Sorghum	4.57	4.62	4.60	4.71	-2.50	-	-
15	Chilli	3.27	3.30	3.29	3.34	-1.67	3.08	6.24

10. MULTI CROP THRESHER

10.1 Labour usage pattern generated by using 'Multi Crop Thresher' among sample farmers in Karnataka

A close perusal of the Table 217 revealed that, the annual labour usage pattern generated by 2011-12 beneficiaries was 116.92 MD and 106.50 MD for SC/ST and general category farmers respectively which valued to Rs. 29230 and Rs. 26625 for SC/ST and general category farmers. The annual employment generated by 2012-13 beneficiaries was 118 MD per farmer per year and 112 MD per farmer per year by SC/ST and general category farmers respectively which valued to Rs. 26061 and Rs. 24684 respectively. Whereas, non-beneficiaries was 146 MD per farmer per year and 142 MD per farmer per year by SC/ST and general category farmers respectively which valued to Rs. 36595 and Rs. 35575 respectively

Table 217: Labour usage pattern generation from using of 'Multi crop thresher' among sample farmers

Sl. No.	Category	2011-12 Beneficiaries (n=38)		Non-Beneficiaries (n=38)	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	116.92	29230	146.38	36595
2	General	106.50	26625	142.30	35575
Sl. No.		2012-13 Beneficiaries (n=52)			
1	SC/ST	118.46	26061		
2	General	112.20	24684		

*MD-Man Days

10.2 Annual income generation by usage of 'Multi Crop Thresher' among sample farmers in Karnataka

The annual net income generated by 2011-12 beneficiaries was Rs. 57,791 and Rs. 54,605 by SC/ST and general category farmers respectively and by 2012-13 beneficiaries it was Rs. 70,362 and Rs. 69,841 by the SC/ST and general category farmers respectively. The average annual income generated by non-beneficiary SC/ST farmers was observed to

be higher than general category farmers similarly the same trend was seen in beneficiary farmers of the year 2011-12 and 2012-13.

Table 218: Annual Income generation from using of 'Multi crop thresher' among sample farmers

Rs./year								
Sl no.	2011-12 Beneficiaries (n=38)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=38)		
	Category	Total gross returns	Total operation cost	Total Net income		Total gross returns	Total operation cost	Total net income
1	SC/ST	108328	50537	57791	-21.75	145960	75598	70362
2	General	102933	48328	54605	-27.90	142636	72795	69841
Sl. no.	2012-13 Beneficiaries (n=52)							
1	SC/ST	106178	54689	51489	-36.65			
2	General	102010	52431	49579	-40.87			

11. M.B. PLOUGH

11.1 Labour usage pattern generated by using 'MB Plough' among sample farmers in Karnataka

The total annual average employment generated during 2011-12 beneficiaries by using MB Plough was 40.62 MD which valued to Rs. 8421 which involved 18.30 MD employment generated by SC/ST category farmers and 22.32 MD of employment generated by general category farmers. The average annual employment generated during the year 2012-13 beneficiaries was 42.88 MD which valued to Rs. 9187.

The employment generated by non-beneficiary farmers was 35.33 MD which included 15.47 MD of SC/ST category farmers and 19.85 MD of employment by general category farmers. Total value of employment generated by non-beneficiary farmer was Rs. 7516.

11.2 Annual income generation by usage of ‘MB Plough’ among sample farmers in Karnataka

The annual average net income generated by using MB Plough in 2011-12 beneficiaries was Rs. 109489 and in 2012-13 beneficiaries the net income generated was Rs. 117433. The annual net income generated by SC/ST category in 2011-12 beneficiaries was Rs. 44285 and by general category farmers Rs. 65204. The net income generated by 2012-13 beneficiaries Rs. 52641 and Rs. 64692 by SC/ST and general category farmers respectively. The total annual net income generated by non-beneficiary farmers was Rs. 88866 which included Rs. 38045 from SC/ST category farmers and Rs. 50821 from general category farmers. The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be 14.09 and 22.06 per cent respectively.

Table.219 Labour usage pattern generated due to using ‘M.B.Plough’ among sample farmers in Karnataka

(Per year)

Sl. No.	Category	2011-12 Beneficiaries		Non-Beneficiaries	
		Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	18.30	3659	15.48	3289
2	Others	22.32	4762	19.85	4227
Sl. No.		2012-13 Beneficiaries			
1	SC/ST	20.79	4417		
2	Others	22.09	4770		

Note : MD- Man days

Table.220 Annual Income generation by using ‘M.B.Plough’ among sample farmers in Karnataka

Sl. No.	2011-12 Beneficiaries					% change in beneficiaries over non-beneficiaries	Non-Beneficiaries		
	Machinery	Category	Total gross returns	Total operation cost	Total net income		Total gross returns	Total Operation cost	Total net income
1	M. B Plough	SC/ST	55375	11089	44285	14.09	47561	9516	38045
		Others	78634	13430	65204				
Sl. No.	2012-13 Beneficiaries								
1	M. B Plough	SC/ST	74261	21620	52641	27.73			
		Others	81252	16560	64692	21.44			

12. ROTOVATOR

12.1 Labour usage pattern generated by using ‘Rotovator’ among sample farmers in Karnataka

A close perusal of the Table 221 revealed that, the average annual employment generated was 23.05 for SC/ST and 21.12 for General category in 2011-12 and 17.32 MD and 15.28 MD in 21.22 MD and 23.04 MD for non-beneficiary farmers. The value of employment generated by non-beneficiary farmers was slightly high compared to beneficiary farmers as they utilized machinery quite commercially.

12.2 Annual income generation by usage of ‘Rotovator’ among sample farmers in Karnataka

The average annual net income generated by SC/ST category beneficiary farmers was Rs. 22,281 and Rs. 18,261 respectively for 2011-12 and 2012-13 and by the other category farmers the net annual income generated was Rs. 16,769 and Rs. 17,060 per 2011-12 and 2012-13 beneficiaries respectively. The net annual income generated by the non-beneficiary farmers was Rs. 23,739 and Rs. 21,876 for SC/ST and general category farmers respectively (Table-222). The percentage change of net income for SC/ST and General Category farmers, beneficiaries over the non-beneficiaries was found to be negative with 10.07 and 20.86 per cent respectively.

Table 221: Labour usage pattern generation by using 'Rotovator' among sample farmers in Karnataka

SI. No.	2011-12 Beneficiaries (n=41)			Non-Beneficiaries (n=38)	
	Category	Labour		Labour used	
		MD	Value	MD	Value
1	SC/ST	23.05	4840.5	17.32	3637.2
2	General	21.12	4435.2	15.28	3208.8
SI. No.	2012-13 Beneficiaries (n=49)				
1	SC/ST	21.22	4456.2		
2	General	23.04	4838.4		

*MD-Man Days

Table 222: Annual Income generation from using of 'Rotovator' among sample farmers

SI. No.	2011-12 Beneficiaries (n=41)				% change in beneficiaries over non-beneficiaries	Non-Beneficiaries (n=38)		
	Category	Total gross returns (Rs.)	Total Operation cost (Rs.)	Net income (Rs.)		Total gross returns (Rs.)	Total Operation cost (Rs.)	Net income (Rs.)
1	SC/ST	85465	47396	38069	10.07	70913	36677	34236
2	General	83828	47369	36458	20.86	65645	36791	28854
SI. No.	2012-13 Beneficiaries (n=49)							
1	SC/ST	84899	50060	34839	1.73			
2	General	84412	47054	37359	22.77			

13. SEED CUM FERTILIZER DRILL

13.1 Labour usage pattern generated by using ‘Seed Cum Fertilizer Drill’ among sample farmers in Karnataka

A close perusal of the Table 223 revealed that the annual employment generated by SC/ST category beneficiary farmers during 2011-12 and 2012-13 was 25.25 man days and 28.08 man days respectively and by general category farmers during 2011-12 and 2012-13 was 21.72 man days and 24.60 man days respectively. The non beneficiary SC/ST and general category farmers generated annual employment of 23.54 and 25.65 man days respectively.

13.2 Annual income generation by usage of ‘Seed Cum Fertilizer Drill’ among sample farmers in Karnataka

A close perusal of the Table 224 revealed that the annual net income generated by using Seed cum Fertilizer drill among beneficiary SC/ST and General category farmers was Rs. 31,792 and Rs. 39,919 respectively for 2011-12 beneficiaries and Rs.31,732 and Rs. 32,872 respectively for 2012-13 beneficiaries. Whereas the annual net income generated for non-beneficiaries by using Seed cum Fertilizer Drill was Rs. 28,868 and 27,680 for SC/ST and Others Category farmers respectively. The percentage change of net income for SC/ST and Others Category farmers, beneficiaries over the non-beneficiaries was found to be 9.20 and 30.66 per cent respectively.

Table 223: Annual Labour usage pattern generation by using 'Seed cum Fertilizer drill' among sample farmers in Karnataka

Sl. No.	2011-12 Beneficiaries (n=33)					Non-Beneficiaries (n=28)		
	Category	Total gross returns (Rs.)	Total operation cost (Rs.)	Net income (Rs.)	% change in beneficiaries over non-beneficiaries	Total gross returns (Rs.)	Total operation cost (Rs.)	Total net income (Rs.)
1	SC/ST	38885.90	17107.49	21778.41	9.20	35971.35	18579.33	17392.02
2	Others	38270.80	17567.59	20703.21	30.66	37914.84	17708.23	20206.61
Sl. No.	2012-13 Beneficiaries (n=27)							
1	SC/ST	18768.55	18733.89	18768.55	9.03			
2	Others	18771.95	18073.87	18771.95	15.80			

Table 224: Annual Income generation by using 'Seed cum Fertilizer drill' among sample farmers in Karnataka

Sl. No.	2011-12 Beneficiaries (n=33)			Non-Beneficiaries (n=28)	
	Category	Labour		Labour	
		MD	Value (Rs.)	MD	Value (Rs.)
1	SC/ST	17.41	3363.14	16.19	3096.58
2	Others	17.21	3345.93	16.94	3283.70
Sl. No.	2012-13 Beneficiaries (n=27)				
1	SC/ST	16.33	3218.30		
2	Others	16.21	3180.08		

* MD-Man Days

Demand/need/requirement analysis of different farm machineries

The different district farmer's demand/requirement of different farm machineries was presented in Table 225. According their requirement and climatic condition of their respective district they demanded different farm machineries. Among the beneficiary farmers of Bijapur district demand the some farm equipments like M.B plough (28) followed by seed cum fertilizer drill and P.P equipment (10) multi-crop thresher (9), Rotavator (8) cultivator (4), Diesel pump set and chaff cutter(1).

Bagalkot beneficiary farmers required seed cum fertilizer drill and P.P equipment (9) followed by M.B plough (5), multi-crop thresher (3), chaff cutter as well as cultivator (2) and Diesel pump set (1). In case of Belgaum district beneficiary other farm machineries those were M. B plough (89), P.P equipments (48), Rotavator (35), diesel pump set (29), leveler blade (19), disc harrow (15) and Chaff cutter (11). M.B plough (41) was a major required farm machinery in Chitradurga district farmers and they demand other machineries also those were disc harrow (30), cultivators (11), Rotavator (11), seed cum fertilizer drill (9), P.P equipments, Chaff cutter (7) and leveler blade and blade harrow (2).

Chikkaballapur farmers demanded the many farm machineries those were Rotavator (10) followed by M.B plough (6), power tiller and cultivator (3), P.P equipments, seed cum fertilizer drill (2) and disc harrow and Chaff cutter (1). Gulbarga district farmers required few farm machineries which were diesel pump set and P.P equipments (11) and M.B plough, Multi-crop thresher, Seed cum fertilizer drill (3) a very few of koppal district farms need the cage wheel (17), seed cum fertilizer drill (11) and leveler blade(5)

Some of the machineries required by the Mysore farmers were Rotavator (20) and cultivator, power tiller (8). Tumkur beneficiary farmers required the farm machineries based on their cultivation those were, power tiller (19) followed by cultivators (15) blade harrow(9) and Seed cum fertilizer drill, M.B. plough, paddy transplanter, Ragi cleaning machine, coconut harvester and Arecanut cutter(4). In case of Raichur, the beneficiary required Seed cum fertilizer drill (25), followed by P.P equipment and M.B. plough (19), combined harvester (15) and cultivator, power tiller diesel pumpset and sprinkler(12).

Table.225 Demand of different farm machineries from the beneficiaries in karnataka

District	Operation	Machinery	Beneficiaries (n=89)	Rank
Bijapur	Land preparation	M. B. Plough	28	I
	Sowing Purpose	Seed cum fertilizer drill	10	II
	Plant protection	P.P equipment	10	
	Threshing Purpose	Multi-crop thresher	9	III
	Land preparation	Rotavator	8	IV
	Pulverizing the soil and Inter-cultivation	Cultivator	4	V
	Irrigation	Diesel pumpset	1	VI
	Chop up the fodder	Chaff cutter	1	
Bagalkot			Beneficiaries (n=31)	Rank
	Sowing Purpose	Seed cum fertilizer drill	9	I
	Plant protection	PP equipments	9	
	Land preparation	MB Plough	5	II
	Threshing Purpose	Multi-crop thresher	3	III
	Chop up the fodder	Chaff cutter	2	IV
	Pulverizing the soil and Inter-cultivation	Cultivator	2	
	Irrigation	Diesel pumpset	1	V
Belgaum			Beneficiaries (n=328)	Rank
	Land preparation	M.B Plough	89	I
	Plant protection	PP equipments	48	II
	Land preparation	Rotavator	35	III
	Irrigation	Diesel pumpset	29	IV
	Land leveling	Leveler blade	19	V
	Breaking soil cluster	Disc harrow	15	VI
	Chop up the fodder	Chaff Cutter	11	VII
Chitradurga			Beneficiaries (n=134)	Rank
	Land preparation	MB Plough	41	I
	Breaking soil cluster	Disc harrow	30	II
	Pulverizing the soil and Inter-cultivation	Cultivators	11	III
	Land preparation	Rotavator	11	

	Sowing Purpose	Seed cum fertilizer drill	9	IV
	Plant protection	PP equipments	7	V
	Chop up the fodder	Chaff Cutter	7	
	Land leveling	Leveler blade	2	VI
	Land leveling & Breaking soil cluster	Blade harrow	2	
Chikkaballapur			Beneficiaries (n=68)	Rank
	Land preparation	Rotavator	10	I
	Land preparation	MB Plough	6	II
	All farm operations	Power tiller	3	III
	Pulverizing the soil and Inter-cultivation	Cultivators	3	III
	Plant protection	PP equipments	2	IV
	Sowing Purpose	Seed cum fertilizer drill	2	IV
	Breaking soil cluster	Disc harrow	1	V
	Chop up the fodder	Chaff Cutter	1	
Gulbarga			Beneficiaries (n=37)	Rank
	Irrigation	Diesel pump sets	11	I
	Plant protection	PP equipments	11	
	Land preparation	M.B Plough	3	II
	Threshing Purpose	Multi-crop thresher	3	
	Sowing Purpose	Seed cum fertilizer drill	3	
Koppal			Beneficiaries (n=36)	Rank
	Puddling	Cage wheel	17	I
	Sowing Purpose	Seed cum fertilizer drill	11	II
	Land leveling	Leveler blade	5	III
Mysore			Beneficiaries (n=44)	Rank
	Land preparation	Rotavator	20	I
	Pulverizing the soil and Inter-cultivation	Cultivators	8	II
	All farm operations	Power tiller	8	

Raichur			Beneficiaries (n=178)	Rank
	Sowing Purpose	Seed cum fertilizer drill	25	I
	Plant protection	P.P equipments	19	II
	Land preparation	M.B Plough	19	
	Harvesting Purpose	Combined harvester	15	III
	Pulverizing the soil and Inter-cultivation	Cultivators	12	IV
	All farm operations	Power tiller	12	
	Irrigation	Diesel pump sets	12	
	Irrigation	Sprinkler	12	
Tumkur			Beneficiaries (n=76)	Rank
	All farm operations	Power tiller	19	I
	Pulverizing the soil and Inter-cultivation	Cultivators	15	II
	Land leveling & Breaking soil cluster	Blade harrow	9	III
	Sowing Purpose	Seed cum fertilizer drill	4	IV
	Land preparation	M.B Plough	4	
		Paddy transplanter	4	
		Ragi cleaning machine	4	
		Coconut harvester	4	
		Areca nut cutter	4	

IV. SUGGESTIONS/RECOMMENDATIONS

- 1) There is a need to conduct more number of trainings and exhibitions to create awareness about machinery, its usage and also subsidy schemes at village level demonstration by the Department of Agriculture, State Agril. Universities and Dept. of Horticulture.
- 2) In order to have more successful implementation of farm mechanization scheme in Karnataka, Government may increase the subsidy amount (75 per cent) to others categories of farmers.
- 3) The procedure of availing subsidy by the beneficiary farmers may be simplified for the better performance of the scheme.
- 4) As such the benefits of the scheme has been well utilized by the beneficiary farmers in the study area, however there is a need to supply the machinery at right time by the supplying agencies in order to have more impact of the scheme on the farmers.
- 5) According to the location specific and need based farm machineries (Table 225) can be supplied which will enhance the utility of the scheme.
- 6) The availing of repair service at village level was lacking and hence the Department of Agriculture should encourage establishment of service units especially among rural youths, which will facilitate in adoption of Hi-tech farm machinery at farmers level.
- 7) The machinery supplied under subsidy scheme, should be suited to the capacity of tractor especially for Rotovator (Belgaum district) and hence there is a need to supply the proper machinery which match with capacity of tractor.