# ECONOMIC ANALYSIS OF AGRICULTURAL TRANSFORMATION PROCESS IN KARNATAKA TOWARDS INCLUSIVE GROWTH

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**BANGALORE-65**

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in

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**BANGALORE** **JANUARY, 2014**

*Affectionately dedicated to*

*My beloved*

*Mother, Father, Brother, Sister-in-law, Sister,*

*Friend Galleppa and Teachers*

**DEPARTMENT OF AGRICULTURAL ECONOMICS**
**UNIVERSITY OF AGRICULTURAL SCIENCES**
**GKVK, BANGALORE - 560 065**

## CERTIFICATE

This is to certify that the thesis entitled **"ECONOMIC ANALYSIS OF AGRICULTURAL TRANSFORMATION PROCESS IN KARNATAKA TOWARDS INCLUSIVE GROWTH"** submitted by **Mr. BASAVARAJ R. JAMAKHANDI, ID.NO. PAL 0001** in partial fulfillment of the requirements for the degree of **DOCTOR OF PHILOSOPHY** in **AGRICULTURAL ECONOMICS** to the University of Agricultural Sciences, GKVK, Bangalore is a record of bona-fide research work done by him during the period of his study in this University under my guidance and supervision and the thesis has not previously formed the basis for the award of any other degree, diploma, associateship, fellowship or other similar titles.

Bangalore,
02 January, 2014

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*January, 2014* *Basavaraj R Jamakhandi*

**ECONOMIC ANALYSIS OF AGRICULTURAL TRANSFORMATION PROCESS IN KARNATAKA TOWARDS INCLUSIVE GROWTH**

**Basavaraj R. Jamakhandi**

**Abstract**

In this study, the economic analysis of agricultural transformation process in Karnataka is analyzed using Factor Analysis, Markov Chain Analysis and Marketable surplus. The study was based on both primary and secondary data wherein primary data has been collected from the farmers and secondary data obtained from Village Dynamic Study in South Asia from ICRISAT. The results revealed that, in Bijapur district farmers have transformed from technology and market lead to surface irrigation lead agriculture while in the case of Tumkur district, farmers transformed from cultivation of diversified low value crops to irrigated high value crops. In Kappanimbargi, The probability of shift from the vegetables to pulses and oilseeds is 0.86. In Markabbinahalli, the probability of shift from sorghum and bajra to redgram is substantial (1). In Tharati, the probability of moving from *Acorus calamus* to chrysanthemum is substantial (0.93) while in the case of Belladamadagu, transition from cereals and millets to pulses and oilseeds as 1.00 and the volume of Milk collected by the Dairy increased from 180 litres per day in 2000 to 500 litres per day in 2010, an increase of 17.8 percent per year. In Bijapur district; the marketable surplus was low (30 %) in the case of sorghum and bajra crop while in Tumkur district it was low (38 %) for ragi crop. The development programs in Bijapur district are providing higher benefit of 15 % (Rs.9170) per family than that of Rs.7982 received per family in Tumkur district. The research study found that, the sample households have been accessing agricultural information from word of mouth (40 %) followed by progressive farmers, input dealers and *State Raitha Samparka Kendra.* In Tharati, by selling water for agriculture purpose, the groundwater sellers realized higher net returns (Rs. 46883) which is 48 % compared to the farmers buying irrigation water for chrysanthemum cultivation (Rs.31620) and the groundwater buyer paid 1/3rd of produce income to groundwater seller (Rs.22200).

Date: **(Dr. M.G. Chandrakanth)**
Place: Bangalore Major Advisor

# ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಕೃಷಿ ರೂಪಾಂತರ ಪ್ರಕ್ರಿಯೆಯ ಆರ್ಥಿಕ ವಿಶ್ಲೇಷಣೆ

**ಬಸವರಾಜ ಜಮಖಂಡಿ**

## ಸಾರಾಂಶ

ಕರ್ನಾಟಕ ಕೃಷಿ ರೂಪಾಂತರ ಪ್ರಕ್ರಿಯೆಯ ಆರ್ಥಿಕ ವಿಶ್ಲೇಷಣೆಗಾಗಿ ಈ ಅಧ್ಯಯನವನ್ನು ಕೈಗೊಳ್ಳಲಾಗಿದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಫಾಕ್ಟರ ವಿಶ್ಲೇಷಣೆ, ಮಾರ್ಕೊವ ಚೈನ್ ವಿಶ್ಲೇಷಣೆ ಹಾಗೂ ಮಾರುಕಟ್ಟೆ ಹೆಚ್ಚುವರಿ ಕಾರ್ಯ ವಿಧಾನಗಳನ್ನು ಬಳಸಿಕೊಂಡು ವಿಶ್ಲೇಷಿಸಲಾಗಿದೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪ್ರಾಥಮಿಕ ಮತ್ತು ದ್ವಿತಿಯಕ ಅಂಕಿ ಅಂಶಗಳ ಮಾಹಿತಿಯನ್ನು ಬಳಸಿಕೊಂಡು ಅಧ್ಯಯನದ ಉದ್ದೇಶಗಳನ್ನು ವಿಶ್ಲೇಷಿಸಲಾಗಿದೆ. ಬಿಜಾಪುರ ಜಿಲ್ಲೆಯಲ್ಲಿ ರೈತರು ತಂತ್ರಜ್ಞಾನ ಮತ್ತು ಮಾರುಕಟ್ಟೆ ಮೂಂಚೂಣಿಯ ಕೃಷಿಗೆ ಪರಿವರ್ತನೆಗೊಂಡಿದ್ದಾರೆಂದು ಕಂಡು ಬಂದಿದೆ. ಅದೆ ರೀತಿ ತುಮಕೂರ ಜಿಲ್ಲೆಯಲ್ಲಿ ರೈತರು ವೈವಿಧ್ಯಮಯ ಕಡಿಮೆ ಮೌಲ್ಯದ ಬೆಳೆಗಳಿಂದ ನೀರಾವರಿಯ ಹೆಚ್ಚಿನ ಮೌಲ್ಯದ ಬೆಳೆಗಳಿಗೆ ಪರಿವರ್ತನೆಗೊಂಡಿದ್ದಾರೆ. ಕಪನಿಂಬರಗಿಹಳ್ಳಿಯಲ್ಲಿ ತರಕಾರಿ ಬೆಳೆಗಳಿಂದ ದ್ವಿದಳ ಹಾಗೂ ಎಣ್ಣೆಕಾಳು ಬೆಳೆಗಳಿಗೆ ಪರಿವರ್ತನೆಗೊಂಡಿರುವ ಸಂಭವನೀಯತೆ ೦.೮೬ ಹಾಗೂ ಮರಕಬ್ಬಿನ ಹಳ್ಳಿಯಲ್ಲಿ ಜೋಳ ಮತ್ತು ಸಜ್ಜೆ ಬೆಳೆಗಳಿಂದ ತೊಗರಿಗೆ ಪರಿವರ್ತನಾ ಸಂಭವನೀಯತೆಯು ಗಣನೀಯವಾಗಿದೆ (೧.೦೦) ಅದೆ ರೀತಿ ಥರಟಿ ಹಳ್ಳಿಯಲ್ಲಿ ರೈತರು ಭಜೆ ಬೆಳೆಯಿಂದ ಸೇವಂತಿ ಹೂವಿನ ಬೆಳೆಗೆ ಪರಿವರ್ತನಾ ಸಂಭವನೀಯತೆಯು ೦.೯೩ ಆಗಿದೆ ಮತ್ತು ಬೆಲ್ಲದಮಡಗು ಹಳ್ಳಿಯಲ್ಲಿ ಕಿರು ಧಾನ್ಯ ಮತ್ತು ಏಕದಳ ಬೆಳೆಗಳಿಂದ ದ್ವಿದಳ ಮತ್ತು ಎಣ್ಣೆ ಕಾಳು ಬೆಳೆಗಳಿಗೆ ಪರಿವರ್ತನಾ ಸಂಭವನೀಯತೆಯು ೧.೦೦ ಎಂದು ತಿಳಿದು ಬಂದಿದೆ. ಬೆಲ್ಲದಮಡಗು ಹಳ್ಳಿಯಲ್ಲಿ ಇಸವಿ ೨೦೦೦ ದಿಂದ ೨೦೧೦ ವರೆಗೂ ಪ್ರತಿದಿನ ಸಂಗ್ರಹಿಸಿದ ಹಾಲಿನ ಪ್ರಮಾಣವು ೧೮೦ ಲೀಟರಗಳಿಂದ ೫೦೦ ಲೀಟರಗಳಿಗೆ ವೃದ್ಧಿಗೊಂಡಿದೆ. ಮಾರುಕಟ್ಟೆ ಹೆಚ್ಚುವರಿಯು ಬಿಜಾಪುರ ಮತ್ತು ತುಮಕೂರ ಜೆಲ್ಲೆಯಲ್ಲಿ ಅನುಕ್ರಮವಾಗಿ ಜೋಳ (ಶೇ.೩೦) ಮತ್ತು ರಾಗಿ (ಶೇ.೩೮) ಬೆಳೆಯಲ್ಲಿ ಕಡಿಮೆ ಇರುವದು ಕಂಡು ಬಂದಿದೆ. ಬಿಜಾಪುರ ಜಿಲ್ಲೆಯನ್ನು  ತುಮಕೂರ ಜೆಲ್ಲೆಗೆ ಹೋಲಿಸಿದರೆ ಬಿಜಾಪುರ ಜಿಲ್ಲೆಯಲ್ಲಿ ಅಭಿವೃದ್ಧಿ ಕಾರ್ಯಕ್ರಮಗಳಿಂದ ಸರಾಸರಿ ಪ್ರತಿ ಕುಟುಂಬಕ್ಕೆ ಶೇ.೧೫ ರಷ್ಟು ಅಧಿಕ ಪ್ರಯೋಜನೆ ಪಡೆದಿರುವದು ಕಂಡು ಬಂದಿದೆ. ರೈತರು ಕೃಷಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಮಾಹಿತಿಯನ್ನು ನೆರೆ ಹೊರೆಯ ರೈತರಿಂದ (ಶೇ.೪೦ರಷ್ಟು), ಪ್ರಗತಿಪರ ರೈತರಿಂದ, ಬೀಜ ವಿತರಕರಿಂದ ಮತ್ತು ರೈತ ಸಂಪರ್ಕ ಕೇಂದ್ರಗಳಿಂದ ಪಡೆದಿರುತ್ತಾರೆ.ಅಂತರ್ಜಲ ಮಾರಾಟಗರರು ಕೃಷಿ ಉದ್ದೇಶಕ್ಕಾಗಿ ನೀರು ಮಾರಾಟ ಮಾಡುವ ಮೂಲಕ ಪ್ರತಿ ೧೦ ಗುಂಟೆಗೆ ರೂ.೪೬೮೮೩ಗಳನ್ನು ಪಡೆದಿರುತ್ತಾರೆ, ಈ ಮೊತ್ತವು ಅಂತರ್ಜಲ ಖರೀದಿದಾರರ ಒಟ್ಟು ಆದಾಯದ ಶೇ.೪೮ರಷ್ಟು ನಿವ್ವಳ ಆದಾಯವು ಅಧಿಕವಾಗಿದೆ. ಅಂತರ್ಜಲ ಖರೀದಿದಾರರು ತಮ್ಮ ಒಟ್ಟು ಆದಾಯದ ೧/೩ನೆಯ ಭಾಗವನ್ನು ಅಂತರ್ಜಲ ಮಾರಾಟಗಾರರಿಗೆ ನಿಡುತ್ತಾರೆಂದು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಕಂಡು ಬಂದಿದೆ.

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# INTRODUCTION

# CHAPTER I

# INTRODUCTION

Agriculture continue to play an important role in Indian economy, as most of the rural people dependent on the agriculture sector, directly or indirectly for their livelihood security.

In India, agriculture has made a substantial progress in two time periods; (1) green revolution period and (2) Post green revolution period (economic liberalization). Green revolution since 1966, has led to increase in food security and post green revolution which commenced with a greater impetus, from 1990, has differential impacts providing livelihood security to farmers towards improving their entrepreneurial ability.

Rainfed areas currently constitute 55 per cent of the net sown area of the country and arehome to two-thirds of livestock and 40 per cent of human population. In green revolution period characterization, rainfed area is mainly focused on few factors of bio-physical indicators without giving consequences to socio-economic aspects related to livelihood issues. In post green revolution period, importance is given to different factors such as regionally differentiated interventions benefitting natural resource endowment, social capital, infrastructure and economic conditions that are need of the hour to meet the local challenges and sustain livelihood security (NRAA, 2012).

**Green Revolution Period**

The ‘Green Revolution Period’ (1969-1988) era had largely by-passed the rainfed agriculture. Subsequently several development programs were initiated for improving rainfed farming. The “Everything Everywhere” approach of taking up all interventions uniformly across all regions of the country has not paid much dividend. The specific needs of the rainfed farming besides their characterization are of paramount importance. Some efforts have gone in this direction. Earlier most of the efforts of demarcation of dry farming regions in India (Sarkar *et al.* 1982) and its characterization (Soman and Kumar, 1990) were on the basis of rainfall variability within the range of 400 to 1000 mm of rainfall (Das and Kore, 2003).

The rainfed areas *per se* (beyond the purview of drylands) didn't get focused attention for increasing production and productivity. Later, the efforts of prioritization have concentrated mainly on few parameters like percentage irrigation and Below Poverty Line (BPL) families and aridity index etc. for delineating rainfed districts, which are the basis for formulating specific area developmental programmes. In this green revolution period, the aspects like livelihood, soil resources, accessibility of irrigation, socio-economic profile, infrastructure, communication means, etc are not covered.

**Post Green revolution period**

In the Post Green revolution period, regionally differentiated interventions befitting natural resource endowment, social capital, infrastructure and economic conditions are need of the hour to meet the current challenges. For this, it is important to prioritize the areas and identify the possible interventions for formulating any new program. In view of the above, there is an urgent need to prioritize the rainfed areas based on resource availability and livelihood parameters.

The post green revolution period was selective benefiting efficient farmers as the benefits derived depend on the innovative abilities of farmers as entrepreneurs pinning on their efficiency. Further, this also has the ability to widen the economic disparities across space and time.

The post green revolution is enhancing wage income as well as land values in real terms partly responsible for seasonal and permanent migration.

The economic impacts are pervasive and different. The impact of liberalization on post green revolution agriculture throws open challenging issues *inter alia* increased role of farm women, aged farmers and farm machinery in farm operations, increased proportion of fallow lands, increased outmigration of farm families especially from rainfed agriculture areas and increased participation of farmers in the land market.

Agricultural transformation refers to change from one socio-economic status to another socio-economic status. Ex. Access to irrigation, access to new technology, infrastructure, education, income, access to market, gains and lose of crops etc. Inclusive growth refers to inclusion of all weaker (Vulnerable) section of society in development process.

The Cenral Research Institute for Dryland Agriculture (CRIDA) developed a 'Natural Resource Index' (NRI) which includes nine factors like rainfall, frequency of drought, available water content, extent and per cent of degraded and wastelands, irrigation intensity, extent and per cent rainfed area and groundwater status. The Indian Agricultural Statistics Research Institute (IASRI), New Delhi. It constructed 'Integrated Livelihood Index' (ILI) which is a composite of three sub-indices like socio-economic index, health and sanitation index and infrastructure index.

Based upon the Rainfed Areas Prioritization Index (RAPI), Natural Resources Index (NRI) and Integrated Livelihood Index (ILI), the 499 districts of India have been ranked by the National Rainfed Areas

Authority of India. Accordingly in Karnataka state, Tumkur with RAPI of 0.4369, NRI of 0.5957, ILI of 0.4979 and Bijapur district with RAPI of 0.4341, NRI of 0.6070 and ILI of 0.4835 ranked as the top two districts scoring 25$^{th}$ and 26$^{th}$ position respectively considering the three indices in the Report[1]. These lead to the question of agricultural growth in the context of decline in natural resources and natural resource degradation. Diversification of rural livelihood systems plays a crucial role in reducing rural poverty. Thus, the two top districts are further examined for their integration with dairy sector as an income generating activity. Tumkur has a cow density of 38.08, with 33.78 percent of cross breed cows, a buffalo density of 21.02, has a milk production index of 0.85. Bijapur has a cow density of 12.45, with very low percent of cross bred cows (being 0.78 percent), a buffalo density of 16.03, has a milk production index of 0.96. Thus, even though the two districts have not been able to perform considering sustainability, Bijapur with high potential and Tumkur with medium potential in the milk production potential, are in the process of agricultural transformation due to diversification. This research analyzes the process of agricultural transformation in the two chronically drought prone districts of Karnataka, considering the land use and crop pattern changes at macro - district and micro – farm levels in relation to natural resource use, diversification and degradation.

Regional imbalance: The prima facie evidence of inequitable growth in Karnataka is the focus on regional imbalance brought out by the DM Nanjundappa Committee Report[2]. The two chronically drought prone districts of Bijapur and Tumkur respectively belong to the Northern and southern Karnataka, with different foci on development and inclusive

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[1]Report of prioritization of rainfed areas in India by National Rainfed Area Authority, Planning Commission, Government of India in 2012, pp. 47-106.

[2]Report of the High power committee for redressal of regional imbalances in Karnataka, Planning, Programme Monitoring and Statistics Department, Government of Karnataka, 2002, pp. 23 – 27.

growth. The hypotheses of this study are that the economic sustainability of agricultural transformation in chronically drought prone districts is shaped by natural resource use and agricultural diversification.

Karnataka a pioneering agricultural State is no exception to these phenomena as highlighted by Dr DM Nanjundappa committee report on economic disparities in the State.

For this study on the economic analysis of agricultural transformation process in Karnataka, in the top 50 districts identified by the NRAI to receive immediate focus, Tumkur and Bijapur districts, with an all India ranking of the 25th and the 26thconsidering the above indices of vulnerability are respectively in the southern and northern Karnataka. This study is undertaken in the Most Vulnerable Rainfed Area in North Karnataka (MVRANK) - Bijapur district and the Most Vulnerable Rainfed Area in South Karnataka (MVRASK) - Tumkur district.

The assessment of agricultural transformation, over a very small period may not yield sufficient information as the agriculture transformation process in this sector needs relatively more time than in the other sectors of the economy. It is suggested that the agricultural transformation takes over at least 2 to 3 decades should be analysed to infer about importance of factors for agricultural transformation process. Hence, the present study includes 38 years data and which has categorized into (1969-1988) green revolution period and (1989-2007) post green revolution period.

The important factors for agricultural transformation process are considered as follow: area under different crops, ground water irrigation area, surface irrigation area, technology adoption (like high yielding varieties), use of NPK fertilizers, fruit area, vegetables area, rainfall and road length. All the factors in both the districts are not same and it varies according to regions of the area. The transformations, however, are not and cannot be uniform in all the regions.

The present study was undertaken to understand the dynamics of agricultural transformation process in Karnataka. For the reasons mentioned so far, the study considered MVRANK Bijapur district and MVRASK Tumkur district. The period of the study is from 1969 to 1988 as green revolution period and post green revolution period is from 1989 to 2007. In addition, secondary data (which is the primary data obtained at village level by VDSA) for 2009-11 have been used from the Village Dynamics in South Asia (VDSA) project of ICRISAT for ground truth regarding crop pattern shifts if any. Hence, the study was carried out with the following objectives

1. To assess agricultural transformation and analyze the factors contributing such as crop pattern, enterprise combinations, technology, markets, institutions and analyze agricultural transformation process for inclusive growth.

2. To analyze the sources of information and supply of new technology inputs and to estimate marketable surplus and the markets for output in different crops.

3. To estimate impact of Government policies and programs on poverty and development pathways.

4. To estimate how access to irrigation through water markets enhances the livelihood security of the rainfed farmers.

**Hypotheses developed for the above objectives**

1. Access to technology, irrigation, infrastructure, markets, and adoption level determine the agricultural transformation process at micro and macro levels.

2. Agricultural transformation lead to reduction in common lands, gomal lands, cropping pattern with some crops losing and some others gaining

3. Major source of information for farmers in the post green technology is word of mouth followed by input dealers Agricultural Universities.

4. The benefits from developmental programs are not as accessible to small and marginal farmers as for large farmers due to procedural complexities, transaction costs, rent seeking and disinterest.

5. Farmers with access to ground water markets have a greater livelihood security than farmers without access to ground water market.

# REVIEW OF LITERATURE

# CHAPTER II

# REVIEW OF LITERATURE

A review of studies is essential to look into the relevant studies conducted on the problems so far. In addition, the review of studies provides the conceptual and methodological approaches and interpreting the empirical results of the present study. In this chapter, keeping in view the objectives of the study, relevant literature is reviewed in the areas related to the present study. The chapter has been organized under following heads.

2.1 To assess agricultural transformation and analyze the factors contributing such as crop pattern, enterprise combinations, technology, markets, institutions and analyze agricultural transformation process for inclusive growth.

2.2 To analyze the sources of information and supply of new technology inputs and to estimate marketable surplus and the markets for output in different crops.

2.3 To estimate impact of Government policies and programs on poverty and development pathways

2.4 To estimate how access to irrigation through water markets enhances the livelihood security of the rainfed farmers

## 2.1 To assess agricultural transformation and analyze the factors contributing such as crop pattern, enterprise combinations, technology, markets, institutions and analyze agricultural transformation process for inclusive growth.

Jeemol (1983) made a detailed study on the changes in the cropping pattern of Kerala from 1960-61 to 1978-79 in which major emphasis was given to the substitution of coconut for rice. Since paddy is a highly labour intensive crop and coconut is a garden crop a shift from paddy to coconut was given more importance. The study was based on secondary data and district wise analysis of change in gross and relative area under paddy cultivation was found out.

Jessy *et al*. (1990) analysed in depth the cropping pattern in Kerala based on physical, economic and sociological considerations. Major changes in agricultural output might occur due to the changes in gross cropped area, a change in cropping pattern, a change in unit area yield or any combinations of the above. The major objective of the study was to analyze the changes in the cropping pattern in Kerala over the period from 1973-74 to 1986-87 for 16 principal crops.

Joseph (1996) made an analysis on Kerala agriculture with respect to cropping pattern changes. The study intended to infer upon the evolving structure of the State's agriculture. By employing appropriate statistical tools projections of future cropping patterns were made and their long-term socio- economic implications were discussed. By assuming that the past trend in change in crop acreages of major crops would continue, quinquennial time series data on cropping pattern from 1970-71 to 1990-91 were subject to a first order Markov- Chain analysis to obtain the transition probability matrix for cropping pattern changes. The crops considered were rice, tapioca, coconut, rubber, other plantains and cash crops and other crops.

Mani and Jose (1997) analysed shift in the cropping pattern in Kerala based on the inter district, intra district and inter temporal shifts in area, production and yield of rice, coconut and rubber. Secondary data was used for the study within the time span from 1975-76 to1995-96. The study argued that due to free trade strategy in India cropping pattern shift occurred in favour of superior cereals, horticultural crops, vegetables and live stock. In the major states of India the share of area under food crops recorded significant reduction. The study revealed that the area under paddy cultivation come down steeply in the districts of Kerala especially in Thrissur, Kozhikkode, Palakkad and Alappuzha. Another notable feature was the increased area for rubber and coconut cultivation and the yield of rubber notably increased specially due to the effort made by the Rubber Board.

Mahesh (1999) analysed the causes and consequences of changes in the cropping pattern in Kerala, a location – specific study. The study emphasized the pattern of Kerala agriculture was in earlier periods guided by agronomic considerations and consumption needs of farmers but it seems that today mainly market forces determine the emerging trends. Based on secondary data the study showed a steady growth in agricultural income up to mid seventies began to decline and showed a vacillating trend in eighties. At the time of study agricultural income was high due to the contribution of cash crops. Analysis of changes in cropping pattern cited that the area under paddy had nearly halved during the past two decades. According to the study the paddy land conversion took place in three phases, viz the area used for the cultivation of vegetables, banana and plantains and tapioca, second part used for the cultivation of coconut, areca nut and pepper and the third part used for non agricultural purposes.

Thomas (1999) on agricultural performance in Kerala revealed that the changes in the cropping pattern and low growth rate in crop productivity were the two factors in the pattern of agricultural development in Kerala since beginning of 1980s. A detailed examination of the major factors responsible for cropping pattern change was analysed in the study using secondary data during 80s and 90s. Study found that low growth rate in the price of rice, shortage of farm labourers and rapid increase in their daily wages, low price of land under food crops like paddy and tapioca, migration of people to urban areas, rational course of profit maximization were the main reasons for the conversion of land from cultivating food crops to other uses.

Amiya (1963) studied about interstate differences in cropping pattern and productivity under the hypotheses that technical condition of production and structure and relationship of market prices determine the pattern use of the farm. Secondary data were used for the study and the data revealed wide variations in resource productivity between the states and larger the area allocated to a crop the more the concern about climate, soil etc. The major conclusion of the study were that analysis showed a positive relationship between increase in area and increase in yields, and the knowledge of price was necessary for resource allocation.

Kebebe *et al.* (2000) studied the diversification of agriculture in Haryana. Study revealed that cereals, commercial crops, vegetables and fruits were found to be relatively more diversified as compared to pulses and oilseeds among the crop groups. Diversification towards high-tech innovative enterprises within the agricultural sector such as vegetables, fruits and towards agro-food processing and rural non-farm sector has been gaining momentum in the State.

Hazra (2001) studied the changes in cropping pattern at the all India level by considering the area share of crops and crop groups at four time points, respectively the triennium ending average of areas at 1966-67, 1976-77, 1986-87 and 1996-97. The study revealed that there was a shift from traditionally grown less remunerative crops to more remunerative crops. The crop shift took place due to government policies and thrust on some crops in a given time. Market infrastructure development and certain other price related support also induced the changes in cropping pattern.

Jayakumar and Velayudhan (2002) studied the agricultural stagnation in Kerala and reported that agriculture, though stagnant for the last many years , was still a major sector of Kerala economy. They observed that the area and production of food crops had been declining over the years, while the area, production and productivity of cash crops had increased. They concluded that the prevalence of obsolete technology in the state and the relative profitability influenced the farmers' decision to allocate land under different crops and resulted in agricultural stagnation.

Virenderkumar *et al.* (2002) examined the changing cropping pattern in Himachal Pradesh. He reported that total cropped area increased by about 21 thousand hectares from16.69 per cent to 17.06 per cent of the total geographical area during the period 1972-96. The area under wheat, as per cent of total cropped area, increased from 34.27 per cent to 37.66 per cent and that of maize went up from 28.11 per cent to 32.58 per cent. The magnitude of decline in percentage share in area in ragi and other millets was much higher than that of barley.

Acharya (2003) made an attempt to study crop diversification in Indian agriculture. The main objective of the study was to analyze the extent and nature agriculture. The main objective of the study was to analyze the extent and nature the national level to recognize the major crop diversification the author used compound growth rates of area by using secondary data. Another way of looking at crop diversification was by analyzing change in the composition crops in value terms in the post green revolution period between TE 1980-81 and TE 1998-99.

Praduman and Mittal (2003) analyzed Crop Diversification in India- Analysis by State and farm size groups since agricultural diversification is an important instrument for economic growth. The study examined the changes in cropping pattern that took place in various states of India in three decades during 1970s, 1980s and 1990s and measured the aggregate changes in cropping pattern in terms of the substitution and expansion effects. Also it examined the degree of crop diversification in various farm size groups.

Goswami and Challa (2004) made an analysis on Indian land use scenario. The main assumption of the study was the changes in cropping showed a gradual shift. Shift in area from food crops to non-food crops indicated more diversification in recent times. Authors assumed income, demand, price and preference, rural-urban interferences, infrastructure development, government policy and global market as some of the socio-economic factors affecting land use planning. From the analysis of changes in the cropping pattern of India for the periods 1950-51 to 1997-98 it could be seen that the proportion of area under total cereals to total cropped area decreased from 61.1 per cent in 1950-51 to 53.8 per cent in 1997-98. Food crops area, which was 76 per cent of total cropped area, came down to 65.8 per cent and non-food crops increased to34.2 per cent. Authors found some major issues in land use pattern of India which included the conversion of land for non agricultural uses due to urbanization, industrialization, demand for land for housing etc. the impact of WTO for more diversified agriculture, problem of soil salinity etc. which caused changes in cropping pattern.

Singh and Sidhu (2004) analysed factors in declining crop diversification, which was a case study of Punjab. Agricultural production in Punjab had been characterized by a sharp decline in diversity in the cropping pattern and the emergence of wheat-rice specialization over the past few decades. Over use of natural resources, ecological problems and growing income risk were the serious repercussions of that declining diversity. Due to improved yields and increased area wheat and rice experienced the highest growth in output.

Diversification index was calculated to know crop diversity. Growth in the aggregate value of output was decomposed into growth in area and average yield.

Rao and Shahid (2005) studied the dynamics of cropping pattern in sorghum growing states of India. They revealed that at the district level, Dharwad had set of competing crops like groundnut and cotton to sorghum while the Belgaum district had another set of competing crops like pearl millet and maize to sorghum. The Transition Probability Matrix clearly demonstrated that Karnataka had sorghum area retention of 31 per cent in 1970-73.

Dinesh *et al.* (2007) studied the crop diversification in Chattisgarh and observed that the pattern of land use and cropping pattern has changed during pre-reform, reform and post- reform periods. The area under forest had increased in Chattisgarh plains and Northern hills, while it has decreased in Bastar plateau. Land put to non-agricultural uses and cultivable waste land had increased in Chattisgarh plains while it has decreased in Northern hill. The permanent pasture inplains and plateau were depleting very fast. On the other hand, paddy area has been continuously increasing in last three decades. The increase was occurred at the expense of coarse cereals and minor millets area. Wheat area was diverted to gram in post rainy season.

Batla (2008) studied the regional dimensions of inter-crop diversification in India and observed that inter-crop area shifted in favour of high yielding crops lik e wheat, paddy, oilseeds, cotton and sugarcane, up to eighties and towards paddy, sugarcane, fruits- vegetables, fibres, plantations, condiments and spices during the nineties and early 2000. The area under wheat and paddy had expanded solely at the cost of low yield growth crops like coarse cereals and pulses due to price support and HYV programme. The high value commercial crops have benefited both from area shifts as well as fresh land brought under cultivation.

Tingre *et al*. (2008) made an attempt to study the cropping pattern changes and crop diversification in Akola district of Vidarbha. The study revealed that majority of cereal crops showed negative and low growth rates of area during the study period. Soybean had attained important position in the cropping pattern. The trend of crop diversification and cropping intensity increased significantly.

Meenakshi and Indumathy (2009) studied the land utilization and cropping pattern in Tamil Nadu. The study revealed that there was a considerable reduction in the cultivated area and hence output was affected to a great extent. The cropping pattern in the state had a high degree for maladjustment for crops. Roughly 53 per cent of the cultivated area was being used for growing unsuitable crops .

## 2.2 To analyze the sources of information and supply of new technology inputs and to estimate marketable surplus and the markets for output in different crops

Huffman (1974) developed a model to determine the role of education on allocative efficiency, the rates of farmers to the change in optimum quantity of a single input, nitrogen fertilizer in corn production. Significant contribution of education on allocative efficiency was found. He thus opined that decision makers with more education can more quickly grasp changes and adjust more quickly and accurately to them. An increase in the availability of information eases the gathering and processing of information when adjustment is required and that an agricultural extension and education could be considered as the substitute source of allocative efficiency. He thus indicated that extension (information) could reduce the losses from ignorance that was associated with inefficient schooling.

Chaves and Riley (2001) studied the determination of factors influencing integrated pest management adoption in coffee berry borer in Colombiam farms', agriculture, ecosystems and environment. Consider the adoption of pest management strategies to deal with the coffee berry borer pest in Colombia. Using farm level data they find that most farmers adopt a combination of technologies. More technologies are adopted by farmers with higher levels of education, larger plot sizes and an ample supply of labour with which to implement the technologies.

Gershon *et al.* (2004) observed that Farmer Field Schools (FFS) are an intensive training approach introduced in the last decade in many developing countries to promote knowledge and uptake of ecologically sensible production approaches, and in particular, integrated pest management which minimizes pesticide use. Because of the high training cost, the viability of the program depends crucially on the effectiveness of knowledge diffusion from trained farmers to other farmers. This study uses panel data from Indonesia to assess the extent of diffusion of knowledge regarding integrated pest management from trained farmers to other farmers. The results confirm that better knowledge leads indeed to reduced pesticide use, and that trained farmers make a modest gain in knowledge. However, there is no significant diffusion of knowledge to other farmers who reside in the same villages as the trained farmers. These results imply that revision in the training procedures and curriculum need to be considered if the FFS approach is to become viable and effective.

Adhiguru *et al.* (2009) the study on agricultural information flow has revealed that only 40 per cent farm households access information from one or the other source. The popular information sources among farmers have been reported to be fellow progressive farmers and input dealers, followed by mass media. The public extension system has been found to be accessed by only 5.7 per cent households. Only 4.8 per cent of the small farmers have access to public extension workers as compared to 12.4 per cent of large farmers. The sector-wise study on the type of information, sought has revealed that a majority of the farmers have sought information on seed (32-55%) in the cultivation sector; on health care (26-54 %) in animal husbandry; and on management and marketing (8-46 %) in fisheries. Regarding adoption of information by farmers, input dealers and other progressive farmers have depicted greater influence mainly due to easy and convenient access to these sources. The study has suggested promotion of farmers-led extension and strengthening of public extension services to improve coverage and efficiency of agricultural information delivery systems.

Rajni *et al.* (2009) found that Variations in agricultural productivity in different states across the country are mainly due to large differences in the level of adoption of selected agricultural technologies and the underlying determinants of adoption of these technologies. Agricultural technologies selected in this study include high-yielding varieties of seeds, chemical fertilizers, pesticides, use of machinery, etc. The pattern of adoption has been examined across the country based on the 54th round of NSSO dataset. The quantification of adoption has been carried out for each state in the form of a novel 'adoption index'. The relation between adoption index and status of the infrastructure in the corresponding state has been examined. The functional analysis has revealed that infrastructures like electricity, irrigation, credit and extension organizations positively influence the adoption of the improved technologies. The study has suggested that there is a need to formulate policies which would help increase the availability of electricity, irrigation and institutional credit and improve the access to the extension organizations for the adoption of improved agricultural technologies and enhancement in productivity.

### 2.3 To estimate impact of Government policies and programs on poverty and development pathways

De gorter and Harry (1990) studied the dynamics effects of the farm subsidies in the United States. The subsidies a farmer receives are based upon historical plantings, also called based acreage. It is sometimes optimal for a farmer temporarily not to participate in a program in order to increase future subsidies. Farmers with low base acreage opt out of these programs, whereas those with high base acreage participate in them. The article examines aggregate data involving corn, cotton, rice and wheat during 1987. It shows that these programs increase the output of each of these crops and represent an annual deadweight loss of more than $2 billion.

Guia (1991) conducted a study on borrower transaction costs in rural financial markets and their role in the rationing of credit in the Philippines. The conclusions can be drawn from the results of this study that transaction costs play an important role in the demand for credit and in the rationing of credit among borrower classes, the lifting of interest rate restrictions decreased the absolute level of transaction costs in the deregulated period compared to the regulated period, but the change was not statistically significant, indicating that some barriers may be preventing its full effect and transaction costs have a regressive impact on borrowers, which instead of improving after deregulation, has proven to be of greater magnitude.

Tietenberg (1992) opined that expenses, such as court time, lawyers' fee and so on, fall into a category called transaction costs by economists. In the context of natural resource economics concerning property rules and liability rules, the transaction costs include administrative costs incurred in attempting to correct the inefficiency. When the number of parties involved in a dispute is large and the circumstances are common, we are tempted to correct the inefficiency by statutes or regulations rather than court decisions.

Kumbhare *et al.* (1994) defined the transaction cost from the point view of institutions that are lending credit. The transaction cost includes costs associated with loan processing, loan disbursement, and monitoring and loan recovery. The cost associated with collection of information on potential borrowers, assessment of value of collateral and documentation are among the transaction costs.

Srivastava *et al.* (2002) attempted to examine the government subsidy issues in India. Author looks at the critical issues of budget subsidies in India. These issues were discussed in different headings in four sections, *viz.,* rationale of subsidies, measurement issues, volume of subsidies, and quality of subsidies. Author also made an attempt to document reforms in agricultural subsidies in India over a period of time.

Anonymous (2005) studied the impact of subsidy policy on sustainable agricultural products of date palm in the United Arab Emirates (UAE). In this study, enterprise budgets, policy analysis matrix (PAM) and measures of economic protection are used. Using the private cost ratio (PCR) of 14%, the results of the study indicate that the costs or the invested money are less than the achieved value added. However, the domestic resource cost ratio (DRC) is 0.46, indicating efficiency and it means that the UAE has comparative advantage in producing date palms. The nominal protection coefficient for tradable outputs (NPCO) is 1.39, which indicates that the adopted agricultural policy allows the market price to be larger than the social (international) price by 39% (7920/5680=1.39). The nominal protection coefficient for tradable inputs

(NPCI) of 0.88 indicates that there is a decline in the costs paid by the farmer as a result of the government subsidy. This means that the costs of tradable inputs were only 88% of what they would have been at world prices (without policy).

Fan Shenggen and Mukherjee Anit (2005) analyzed the impact of Agricultural research in poverty reduction in India by using state level data for empirical analysis from 1970 to 1995. From this study it was found that Agricultural research investment plays a major role in reduction of urban poverty apart from its large impact on reduction of rural poverty. The agricultural research investment causes reduction in the food prices by increasing the agricultural production. Since urban poor are spending 50-80% of their income on food, they are benefitted proportionately more than non-poor. One of the major finding of this study is that, among all the rural investments considered in the study agricultural research investment has the large impact on the urban poverty reduction per additional unit of investment. At present urban poverty accounts for about 25% of the total poverty in the country and it is expected to increase in future.

Jharwal and Deshpande (2008) conducted a study named Rural Development Programmes in Karnataka: People's Perception and the study was conducted in Bidar district of Karnataka. Here author opined that farmers participation in developmental programmes is affected by different factors namely, illiteracy, lack of information, huge rents, involvement of local leaders in distribution of benefit and lack of congenial environment to avail the benefit of developmental programmes. He suggested to government that instead of proliferating the number of programmes with almost similar centers over a period of time, it is desirable to restrict the number of programmes and increase the breadth of programme beneficiaries

Sharma *et al.* (2010) opine that there is a general view in academic and policy circles that fertilizer subsidies are concentrated geographically on a relatively small number of crops and producers. In many cases fertilizer subsidies do not reach the targeted group(s). They examines the trends in fertilizer subsidy and issues of equity in its distribution between farmers and the industry, across regions/states, crops and different farm sizes. They found that fertilizer subsidy is more concentrated in a few states and interstate disparity in its distribution is still high though it has declined over the years.

Pisani and Giorgio (2011) presented a paper on “Evaluation of social capital promotion in rural developmental programmes: a methodological approach” in which they opine that many of the past literature shows the importance of consistent immaterial contribution of LEAD approach (LA) in the promotion of social capital in rural areas. Therefore the insert of LA in the framework of Rural Development Programmes (RDPs) should be considered a powerful opportunity to promote rural development initiatives by means of a bottom methodology, much more focused on social relationships among local actors. These aspects open new opportunities also in terms of evaluations of RDPs and of LA, in the context of already established Common Monitoring and Evaluation Framework (CMEF). They also presented a methodology for the definition of the Relative Index. Social Capital Promotion (RISCP) to be used in the ongoing evaluation of RDPs. The RIS doesn’t represent an impact indicator, but it measures the potential social capital that could promoted by means of the logic of intervention of selected measures of the RDPs.

## 2.4 To estimate how access to irrigation through water markets enhances the livelihood security of the rainfed farmers

Shah and Raju (1986) recorded that few owners of WEMs did not have surplus water in A.P., but there were many owners who wanted to sell groundwater. However, they could not do so in the absence of buyers. A seller supplied water to 2.6 buyers to irrigate 8 season acre of land in addition to irrigating his own land. A large farmer served more buyers, but marginal and small farmers irrigated more of buyers land.

Kolavalli and Chicoine (1989) found that markets for groundwater have emerged where well owners have surplus water and high demand for irrigation water in Gujarat. Private sellers of water overcome the problem of indivisibility of groundwater investments by selling water and have provided non-well owners access to groundwater. They also found that owners were in a potential monopoly position and barrier to market entry was the investment required to construct a well irrigation system.

Palanisami (1989) reported that about 15 per cent of farmers in tank command owned wells acted like monopolists by exploiting the buyers the buyers by charging higher price for water and maximized their profit in Combater district of Tamil Nadu. The well owners took about 38 per cent of the non-owners income through water sales. He argued that there was on urgent need to control the monopoly behaviour of well owners so that the profit of non-well owners in the tank command can be increased.

Prahladachar (1989) found that access to groundwater be both by ownership and or purchase in one taluk in Karnataka. He suggested that assured markets have encouraged the small farmers to go for well irrigation and grow high value crops.

Ballabh (1989) reported three stages for community tubewell in eastern UP in the first, difference in price charged per hour between member and non member was significantly higher in the second, this difference narrowed down due to the development of water markets. This happened because number of tubewells in the area has increased and average price charged from buyers was less than the average cost per hour in running pump.

Phansalkar (1989) reported that water company (a group of farmers) sold water to farmers at Rs. 36 to 60 for 36 hp to 52 hp electric motors payable accrual to sellers was one and half time to 4 times more than cash payment method.

Agrawal *et al.* (1991) found that water market has been developed and competition between the users of water for different crop seasons was prevailing in Gujarat. More water was sold for cultivation of summer groundnut to small /medium farmers at a remunerative price.

Narayanmoorthy (1991) examined the relationship between sale of water and some determining factors. He found negative correlation between hours to water sale and total area as well as under paddy and sugarcane. While positive correlation has been found between hours of water sale and total hours of water taken from the bore well; association between variables was very weak and not significant. Regression results revealed that sale of water was significantly and positively influenced by the total hours of water taken. When area under paddy of owner decreased, the sale of water increased. It was found that sale of water mostly depended upon the situational factors of the borewell such as the location of the pump set, distance between bore wells, pressure of water in borewell and the cropping pattern of the owner and the buyers. He also observed that selling price per hour was cheap in case of electric pump set (Rs. 5.00) as compared to the diesel pump sets (Rs. 12.00) with equal horsepower in Tamil Nadu.

Prasad (1991) found certain imperfections in the existing water market system in Bihar as evident from its control by large holding class. Large variation in water charges, non-accessibility of all poor farmers to water market due to highly localized nature and discriminatory approach of the water seller for selling water to different categories of farmers were also observed. He reported that all these imperfections have not only restricted the equity effects of water market, but also showed little impact on agricultural production.

Raju and Rao (1991) found that price of water was charged on the spot in cash after season based on number of hours the pump set was put to use in north coastal AP. The rates varied from Rs. 8 per hour depending upon the size of bore, cost and demand for lifting water. The prices were found uniform in all the markets and fluctuation was not observed within the season or between seasons and from seller to seller. Bargaining was also not entertained.

Nadakarni (1992) felt that the emergence of water markets should be welcomed as a progressive development. It has made irrigation available to more people and more areas. It was also suggested that water markets should be researched in an integrated way so as to suggest measures to maximize the efficiency of use of scarce factors of production. Dhawan (1991) argued that capital costs of well irrigation could spread out over a large crop area through rise in market sale / purchase of surplus well water. It appeared that all categories of farmers were engaged in buying and selling of groundwater activity.

Shankar (1992) recorded that average running of electric operated tubewells was 663 hours out 228 hours per years of available per year of available electricity in Eastern UP average operating hour per year of diesel operated tubewell was 177 hours. Income from sale of water per tubewell was Rs. 2154 per year and it generally rose with farm size and covered two thirds of running costs if only cash expenses were to be taken into account.

Prasad (1993) assessed that only 31 per cent farmers mentioned about significant impact of groundwater markets on agricultural production. Though groundwater markets had been spreading but poor farmers were not able to take the advantage of the existence of such markets due to their inability to purchase water and lack of accessibility to groundwater. Dissemination was noticed in the selected of water buyers and price charged.

Janakarajan (1993) found that water charges were dominated in cash and did not vary much between wet and dry land in Vaigai basin in Tamil Nadu. Water charges depended upon the quality of water and type of energy of used. A majority of non-well owner farmers were either just meeting their demand for water or faced water shortage. In Sirunavalpattu village, he found that the water purchase gave one-third demand for water seller. In addition to the payment of water, purchaser was expected to perform certain unpaid and paid services to the water sellers.

Shah and Bhattacharya (1993) found that the water companies performed significantly better than cooperative on account of the operational and economic efficiency in Gujarat. Operating expenses was higher for companies but company earned twice than cooperative in gross income. Its impact on profit was manifold. Organizational performances of the companies were also better than cooperatives. Average price changes by the cooperative and companies was 15 and 4 per cent lesser than private tubewell owners, respectively.

Gupta (1995) found that utilization of assured irrigation was very less at the buyer's farm as compared to the sellers. Sellers were taking several high priced crops and realized higher yields than that of buyers farm. He concluded that area under rabi crops was increasing as the availability of assured irrigation water with buyers was increased.

Swami Nathan and Meinzen dick (1995) found that farmers were trying to get access to supplemental irrigation by purchasing groundwater instead of owning wells in Periyar Vaigai project in Tamil Nadu. They reported that only four per cent tube well owners were sellers and nineteen per cent farmers were buyers. They also found that in lower Bhavani project, groundwater markets were totally absent.

Palanisami *et al.* (1995) observed that well owners acted like monopolists where each well owner was sole supplier of groundwater to a group of farmers located around the well.

Swami Nathan and Meinzen dick (1995) found that one-third tubewell owners have shared ownership in PeriyarVaigai project area in Tamil Nadu, which allow farmers with small holding to invest in wells. In lower Bhavani project area 36 per cent tubewell owner shared tubewell ownership ninety three per cent well owners used electric operated tubewell.

Vaidynanahtan (1996) found evidence of a progressive decline in groundwater tables in several parts of the country and argued that this had important economic and social consequences. As the numbers of wells tapping an aquifer increased, yield per well declined after a point. This increased the investment and operating cost per unit of water. In the absence of a credible collective institution (like) joint ownership and operation, community management or a wide spread water markets) poor farmers could not hope to access well water at all. The study also highlighted the uneven emergence and spread of groundwater markets.

# METHODOLOGY

# CHAPTER III

# METHODOLOGY

This chapter provides information on the study area, sampling procedure followed and analytical tools. It is broadly organized into three head viz., Profile of study area, sampling framework and analytical tools

### 3.1. Profile of study area

The focus of this study is to document, compare and analyze the agricultural transformation process in Bijapur and Tumkur districts of Karnataka. It is in order to highlight the rationale for the choice of Tumkur and Bijapur districts. The National Rainfed Authority of India (NRAI) has ranked Bijapur and Tumkur districts as 25$^{th}$ and 26$^{th}$ considering the Natural Resource Index (NRI), Integrated Livelihood Index (ILI), Rainfed Area Prioritization Index (RAPI) and Milk Production Potential (MPP). Accordingly, in the Nation these two districts rank 1$^{st}$ and 2$^{nd}$ with regard to three indices in Karnataka state. Accordingly Bijapur and Tumkur districts have been chosen for this study. Thus, Bijapur is classified as the Most Vulnerable Rainfed Area in North Karnataka (MVRANK) and Tumkur is classified as the Most Vulnerable Rainfed Area in South Karnataka (MVRISK). Accordingly in Karnataka state, MVRANK Bijapur district with RAPI of 0.4341, NRI of 0.6070 and ILI of 0.4835 and MVRASK Tumkur district with RAPI of 0.4369, NRI of 0.5957, ILI of 0.4979 ranked considering the three indices in the Report[3]. These lead to the question of agricultural growth in the context of decline in natural resources and natural resource degradation. Diversification of rural livelihood systems plays a crucial role in reducing rural poverty. Thus, the two top districts are further examined for their integration with dairy sector as an income generating activity. Tumkur has a cow density

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[3] Report of prioritization of rainfed areas in India by National Rainfed Area Authority, Planning Commission, Government of India in 2012, pp. 47-106.

of 38.08, with 33.78 percent of cross breed cows, a buffalo density of 21.02, has a milk production index of 0.85. Bijapur has a cow density of 12.45, with very low percent of cross bred cows (being 0.78 percent), a buffalo density of 16.03, has a milk production index of 0.96. Thus, even though the two districts have not been able to perform considering sustainability, Bijapur with high potential and Tumkur with medium potential in the milk production potential, are in the process of agricultural transformation due to diversification.

Regional imbalance: The *prima facie* evidence of inequitable growth in Karnataka is the focus on regional imbalance brought out by the DM Nanjundappa Committee Report[4]. The two chronically drought prone districts of MVRANK Bijapur and MVRASK Tumkur respectively belong to the Northern and southern Karnataka, with different foci on development.

In the Semi Arid Tropical Karnataka where the top two vulnerable rainfed districts of the state are located, MVRANK Bijapur district, is chosen with two villages characterized as 1. Grapes Based Farming System - GBFS Kappanimbargi village and 2. Diversified Farming System with a Combination of Food and Commercial Crops-DFSCFCC Markabbinahalli village have been chosen for detailed field survey. In MVRASK Tumkur district, two villages characterized as 1. Floriculture Based Farming System with Groundwater Markets – FBFSGM Tharati village and 2. Groundnut Based Farming System with Dairy as Main Enterprise - GBFSD Belladamadugu, have been chosen for detailed field study and contrasted. Both the districts are situated in Semi-Arid Tropical region.

[4] Report of the High power committee for redressal of regional imbalances in Karnataka, Planning, Programme Monitoring and Statistics Department, Government of Karnataka, 2002, pp. 23 – 27.

**Plate 4.1. Researcher collecting data from farmers of Bijapur district**

### 3.1.1. Grapes Based Farming System (GBFS) – Kappanimbargi village, Indi taluk

The GBFS Kapanimbargi ($17^0$ 11.33' N and $75^0$ 48.12' E; 476 m altitude) is in Indi taluk of Bijapur district in Karnataka state. This village is well connected by NH-13 highway. Major crops cultivated are bajra, groundnut, maize and pigeon pea in kharif season. The rabi jowar and Bengal gram are cultivated in Rabi season. Grapes, pomegranate, ber and citrus crops are the high value horticulture crops cultivated.

About 13 percent of the farmers are cultivating grapes and pomegranate using drip irrigation on about 14 percent of the gross cropped area. As groundwater is economically scarce, in the village, farmers are using drip irrigation to irrigate the crops. The village had around 100 dug wells till 2010, and currently only 10 percent are functioning as 90% of wells dried up. The normal rainfall is around 618 mm. The nearest shandy for Kappanimbaragi village is 7 kms away in Horti village. Farmers sell their produce in APMC Solapur and Bijapur (located 80 Km and 46 Km respectively). Due to the Government scheme of Pradhan Mantri Rojagar Yojana the village has a connecting road.

### 3.1.2. Diversified Farming System with a Combination of Food and Commercial Crops - Markabbinahalli village, Basavana Bagewadi taluk

The DFSCFCC Markabbinahalli ($16^0$ 44.59' N $76^0$ 02.18' E; 554.43m altitude) is situated in Basavana Bagewadi taluka of Bijapur district. In Markabbinahalli village, agriculture is completely dependent on rainfall, as there is no alternative source of irrigation. The DFSCFCC Markabbinahalli is semi arid tropic, with temperature from $16^0$ C to $44^0$ C and an erratic normal rainfall of 630 mm. Currently, farmers are cultivating pigeon pea, cotton and sunflower in Kharif season, and extended to rabi season as they are long duration crops. In Rabi jowar,

**Plate 4.2. Researcher collecting data from sample farmer of Bijapur district**

Bengalgram, wheat, and safflower are cultivated. Weekly shandy in this village commenced since 2008 on Fridays.

The literacy level has improved in the village and youngsters are attracted to non farming activities. Farmers sell their produce in Devara hippargi, Basavana Bagewadi and Bijapur. Drinking water is an acute problem in the village and the available water is brackish. In Markabiinahalli, there are no open wells / bore wells. In addition, all houses in the village have no toilet and sanitation has to be created. The soils of the area are black cotton soils and are fertile. Markabbinahalli is an interior village, 45 km from Bijapur with an approach road. The village does not have dairy co-operative and the farmers are buying pocket milk for their consumption.

### 3.1.3. Floriculture Based Farming System with Groundwater Markets – Tharati village in MVRASK

The FBFSGM Tharati village (13°29.01' N 77°11.38' E) is in Koratagere taluk, 18 km from Tumkur district, 88 km from Bangalore. The geographical area of Tharati is 519 ha and is surrounded by hillocks. Till 2000, farmers of Tharati were cultivating *Acorus calamus* – Sweet Flag (medicinal plant), Baje (in vernacular). This is an annual rhizome cultivated in stagnant water year through. After 2000, due to intensive sand mining, groundwater depleted virtually replacing the water intensive Sweet flag (Baje) crop with low water intensive flower crops such as Arecanut and flower crops such as Chrysanthemum. Thus, due to groundwater scarcity, farmers shifted to short duration high value perennial, vegetable and flower crops

Currently (2013), around 65 % of the farmers in Tharati are cultivating chrysanthemum by staggered planting two crops annually. Among these farmers about 33% are cultivating chrysanthemum by


**Plate 4.3. Scientist from ICRISAT and Professors from UAS, Bangalore were visited to the study villages of Tumkur district.**

purchasing groundwater (or by participating in the water market). This is a *prima facie* indicator that the proportion of well failure is at least 33% since, mainly those farmers who had well irrigation earlier, are now cultivating flower crops using purchased water, as they suffered from well failure. The price of water paid by buyers to water seller is 1/3 rd of the gross income realized from the produce. There was one case where farmer cultivated paddy using purchased water paying on hourly basis @ Rs. 100 per hour of irrigation.

The rainfed crops cultivated are ragi, maize, fodder jowar, pigeon pea, cowpea, dolichos lab-lab and horse gram. Chrysanthemum, Jasmine, paddy, vegetables, arecanut, betelvine and coconut are cultivated with irrigation. Due to illegal sand mining, fetching high wages to workers / farmers, villagers are receiving appreciable off farm income from sand mining activities. Some of them also eak their living by painting and garment work. Due to poor mobile network, information flow is due to word of mouth.

The village is well connected by road and transport facility. Farmers sell their produce in APMCs at Tumkur. Flowers are sold in Tumkur mandi and Bangalore markets. The size of the holding is 0.5 to 1 acre. The Government of Karnataka declared 3693 ha of Koratagere taluk as drought affected for 2012-13[5].

### 3.1.4. Groundnut Based Farming System with Dairy as Main Enterprise– Belladamadugu village, Madhugiri taluk

The GBFSD Belladamadugu village (13°41.82' N and 77° 08.95' E; 789.94 m altitude) is located in Madhugiri Taluk of Tumkur district. The village is 53 km from Tumkur. The vernacular meaning of the village implies 'Bela' - crops grown and 'madagu' – storing the crops; thus

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[5] http://www.rajeev.in/pages/..%5CNews%5CQuestions_Parliament%5CLoss Crops Due Drought Karnataka.html

**Plate 4.4. Researcher collecting data from sample farmers of Tumkur district**

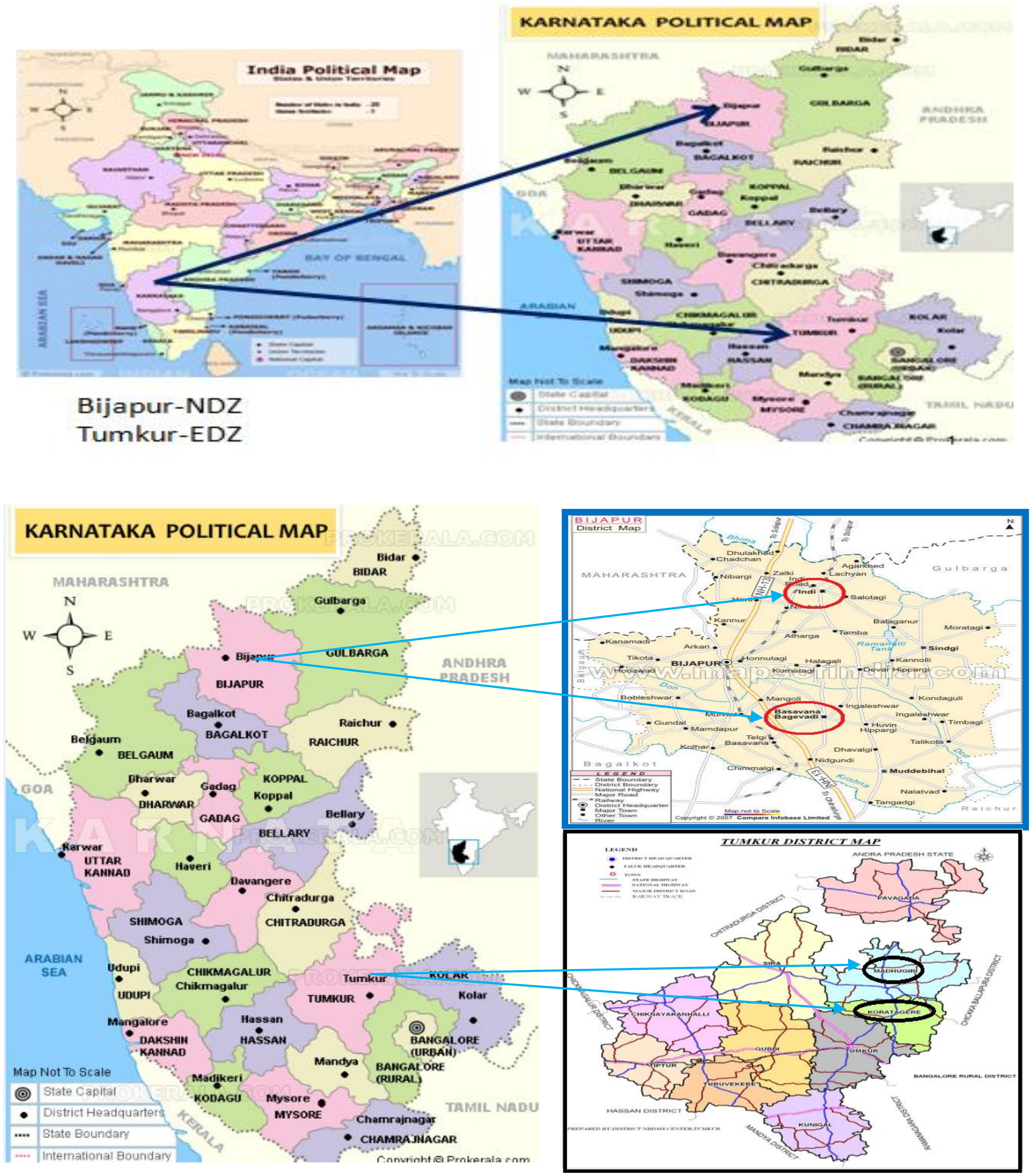
‘Belladamadagu’ implies storing agricultural produce for own consumption. Currently (2013), co-operative dairy is playing an active and important role in integrated farming system with indigenous cow and cross bred cow. Around 600 litres of milk per day are sold to the milk cooperative by farmers of this village.

Groundnut is another important crop of the village in kharif season. In Rabi season farmers with irrigation are cultivating groundnut crop. The crop is vulnerable to root borne disease as a majority of the farmers do not practice crop rotation. The rainfed crops are ragi, pigeon pea, ground nut, fodder jowar, maize, cowpea and dolichos lab-lab. The irrigated crops are paddy, ragi, ground nut, flower, arecanut and coconut. As off-farm activity, leaf plate making is taken up from March to May. Farm women gather leaves of Flame of the forest (*Butea monosperma)* from 30 to 40 Kms surrounding areas of the village and they will store leaves, whenever they find time then they will make the leaf plates. The farmers are facing market problem to sale leaf plates. Hence, they sell it to retailers. Around 11 % of farmers are involved in leaf plate making and fetches Rs. 14000 income from this activity, about 35 % constitute out of total income.

About 3 % of farmers are processing tamarind realizing an income of Rs. 70 to 80 per kg. As there is no weekly market (shandy) in this village, farmers are constrained to grow perishable high value crops like vegetables. There are currently 25 SHGs in the village and their total savings is Rs. 65000 amounting to Rs. 2600 per SHG per annum.

### 3.1.5. Salient features of MVRANK - Bijapur and MVRASK - Tumkur districts

Chalukyas laid the foundation of Bijapur City, ruled and named as "Vijayapura" or "City of Victory". It is situated between $15^{0}50'$ and $17^{0}28'$




**Districts of Karnataka** **Circle indicates the study taluks**

**Fig. 3.1: Map of the study area**

north latitude and $74^{0}54'$ and $76^{0}28'$ east longitude. Prior to 1347, the district was under the control of Allauddin Khilji, Sultan of Delhi and then under the Bahmani Rulers of Bidar. Yusuf Adil Shah, Governor of Bijapur in 1481. The Adil Shahi dynasty which ruled Bijapur had a well developed water distribution system promoting horticulture crops in gardens by providing irrigation facility as a family custom of sultan family. In addition they developed Adilshahi nama, an innovative institution agriculture. The district is bordered by the river Bhima on the North and Krishna on the South. It represents a stark landscape of red, rocky hills, long stretches of treeless fields and gigantic boulders scattered in groups over the rolling plains. The attractive aspect of the district is its historical importance. It was also the capital of the Adil Shahi kingdom. Apart from this, Bijapur has famous temples like Siddeshwara and Shri Eswar Shiva[6].

The MVRASK - Tumkur district is derived from T*ummeguru,* situated between $12^{0}45'$ and $14^{0}20'$ north latitude and $76^{0}20'$ and $77^{0}30'$ east latitude. This town has a history of a couple of centuries and the originator is Kante Arasu, a member of the Mysore royal family. Mysore royal family played a key role in formation and development. Contemporary role of educational organizations run by Siddaganga Mutt and Siddartha group is crucial. Siddaganga Mutt is an unique mutt providing free boarding, lodging & Educational facilities to about 8000 poor Students and is run by Sri Sri Sri Shivakumara Swamiji. General features of both districts are presented in Table 3.1.

## 3.2 Sampling

Studies by ICRISAT VDSA have identified that the North Karnataka districts command greater attention for Research and Development (R&D) with regard to overall development including governance issues. These

[6] http://alumniagribijapur.com/tourism.php

**Table 3.1: Salient features of Bijapur and Tumkur districts**

| Sl. No. | Salient features | Bijapur | Tumkur | Karnataka |
|---|---|---|---|---|
| 1 | **Agro Climatic Zones** | Northern Dry Zone | Eastern Dry Zone | 10 Zones |
| 2. | **Population (No.)** | **2175102** | **2681449** | **61130704** |
| | Urban | 500791(23.02) | 602784(22.48) | 23578175(38.57) |
| | Rural | 1674311(76.98) | 2078665(77.52) | 37552529(61.43) |
| 3. | Literacy Rate (%) | 67 | 74 | 76 |
| 3 | **Farmers (No.)** | **5,03,795** | **9,16,267** | **13110618** |
| | Cultivators (No.) | 217056(43.08) | 602361(65.74) | 6883856 (53) |
| | Agril. Labours (No.) | 286739(56.92) | 313906 (34.26) | 6226762 (47) |
| 4. | **Size of the holding (ha)** | 3.04 | 1.65 | 1.63 |
| 5. | **Source of Irrigation (%)** | | | |
| | Canal irrigation | 21.32 | 2.16 | 35.33 |
| | Tank | 0.32 | 11.64 | 5.20 |
| | Wells | 34.46 | 0.70 | 11.69 |
| | Borewells | 39.44 | 85.43 | 35.98 |
| | Other Sources | 4.43 | 0.00 | 11.74 |
| 6. | **Road Extent (Kms)** | 10304 | 13751 | 222946 |
| 7. | **Comparative Advantages** | | | |
| | Major food crops | Sorghum and Pigeonpea | Finger millet and Groundnut | Rice, Sorghum, Ragi, Tur |
| | Major Commercial crops | Grape, Sugar cane and Pomegranate | Coconut, Flowers and Arecanut | Sugarcane, cotton, Tabacco |
| 8. | **Major Livestock** | | | |
| | Sheep | 336015 (24.68) | 1067709(42.31) | 9565696 (29) |
| | Cattle | 279785 (20.55) | 589226(23.35) | 10507325 (32) |
| | Goat | 452329 (33.23) | 517763(20.52) | 6157134 (19) |
| | Others | 293174 (21.54) | 349029(13.82) | 6653096 (20) |
| | Total Livestock | 1361303(100) | 2523727(100) | 32883251 |
| 9. | **Poultry** | 346406 | 1265978 | 42433692 |

Source: Karnataka at glance 2010-11

are corroborated in the "Report of the High Power Committee for Redressal of Regional Imbalances in Karnataka" chaired by Dr. D.M. Nanjundappa. Accordingly, the district with low high Human Development Index is Bijapur, selected as the district in North Karnataka and for comparison, Tumkur district which is similarly placed in southern Karnataka (Fig. 3.1). Bijapur and Tumkur districts chosen for the study and villages chosen are those where ICRISAT has its VDSA namely Kappanimbargi, Markabbinahalli in Bijapur and Tharati, Belladamadugu in Tumkur.

Secondary data were used to identify the agricultural transformation process at macro level and it has been used to estimate the factor analysis. The two districts considered for the study are compared with regard to the cropping pattern, enterprise combination, technology (High Yielding Varieties), markets and its related infrastructural facilities. The information on various institution and governance are not considered due to non availability of data. Factor analysis is performed on secondary data in the two districts for the two time periods, defined as Green Revolution (1969 to 1988) and Post Green Revolution (1989 to 2007). The probability of transition to different types of land use in the two periods using markov chain analysis is highlighted. In addition, primary data at village level from VDSA for three years (2009 to 2011) has been used to find the ground truth regarding shift in crop pattern. The secondary data relating to Bijapur district and Tumkur district were collected from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) from the Village Dynamics in South Asia (VDSA) project.

For meta analysis, data on crop pattern in DFSCFCC Markabbinahalli and GBFS Kappanimbargi villages in MVRANK Bijapur district. Similarly in FBFSGM-Tharati and GBFSD-Belladamadugu villages of MVRASK Tumkur district, secondary data were collected.

### 3.2.A. Collection of field data from sample farmers

From each study village 30 farmers were selected and the farmers were interviewed using the pre-tested structured schedule prepared for the purpose during Jan – Feb 2013 pertaining to 2012 crop year. The data on socio-economic characteristics, land holding, cropping pattern, crop-wise cost and returns, sources of information of new agricultural technology, markets for crops sold, access to new agricultural technology, marketable surplus, details about developmental programmes/subsidy schemes from which they benefited, impact of Government policies and programmes, type of benefit, magnitude of benefit availed, transaction cost incurred by farmers in availing these benefits from developmental programmes were collected from the sample farmers through personal interview. The secondary data pertaining to different kinds of developmental programmes implemented by all the line departments in the sample villages were collected by personally visiting these line departments and seeking the information from the concerned officials. In addition, in Tharati, to analyze the contribution of water markets to the economy of water buyers, field data from 20 farmers buying irrigation water and 10 farmers selling irrigation water were obtained during Jan – Feb 2013 pertaining to 2012 crop year. In addition, the ICRISAT Village level primary data for 3 years has been collected from Village Level Dynamic Study in South Asia (VDSA) project of ICRISAT in Karnataka

### 3.2.B. Governmental / Developmental Programmes

In this section the details of the developmental programmes from which farmers benefited in Tharati and in Belladamadagu village are given. Efforts have been made to obtain a comprehensive list of programs implemented. In the process it is also likely that a few important programs/ schemes may have been missed, since there is no single place where all the programs by both the State and Central governments addressing development are available. Here are the programs which were mentioned by the Development Departments:

1. **Ration card:** Holder of Ration card depending upon the annual income is eligible to receive food and fuel as under. There are three categories in which benefit is distributed

a. **BPL ration card**: Below Poverty Line ration card is for families with a total annual income from all sources, which is below Rs.12,000/-. The BPL ration card holder is eligible to receive 20 kgs of rice, 3 kgs of wheat and 1 kgs of sugar and 3 litres of kerosene per month.

b. **APL ration card:** Above Poverty Line ration card is for families with a total annual income from all sources which is above Rs.12,000/- The APL card holder is eligible to receive 12 kgs of rice, 2 kgs of wheat and 3 litres of kerosene per month.

c. **Antyodaya anna yojane:** The AAY card is issued to the poorest of the poor families and receives 29 kgs of rice, 6 kgs of wheat and 1 kg of sugar and 3 litres of kerosene per month.

**2. Pension Scheme**

**a. Indira Gandhi National old age pension scheme:**

Under the National Social Assistance Programme (NSAP), Indira Gandhi National Old Age Pension scheme is providing minimum social assistance to the old age poor in the form of pension of Rs. 500 per month. A person who is above 65 years can get benefit from this programme.

**b. Indira Gandhi National Disability Pension Scheme:**

Indira Gandhi National Disability Pension Scheme is providing minimum social assistance to physically handicapped person with handip to the tune of 80% as certified by recognized medical doctor, in the form of pension of Rs. 1000 per month. The handicapped applicant must be in the age group of 18-59 years.

**c. Indira Gandhi National Widow Pension Scheme:**

Monthly pension of Rs. 400 is given to the identified pensioners who are widows of the age group of 40 years to 64 years and are from BPL families.

**3. Yashaswini scheme:**

"Yashaswini" card is the health insurance scheme of the Government of Karnataka. Individuals, who are members of any cooperative society for at least six months prior to July 1 of any year, are eligible for health insurance covering from the new born to 75 years of age in their family. The plan is open to all family members upon primary membership in a cooperative on a voluntary basis. Here the insured beneficiary has to pay a premium of Rs. 210 per year per person and the maximum benefit available per insured person is Rs 100,000 per procedure or Rs. 2,00,000 per annum. The policy must be renewed every year for each insured person in the family.

**4. Bhagyalaxmi yojane:**

This programme is implemented by the Department of Women and Child Welfare, Government of Karnataka to sustain the birth of girl children and to raise the status of the girl child in the family and in society. The BPL families and the families with annual income below Rs. 12000 are eligible to get the benefit. Under the scheme, the insurance cover to the first two girl children soon after the birth will be offered. The Government pays a premium amount of Rs 19,350 for the first girl child and Rs 18,350 for the second girl child. The first girl child will get a bond with a maturity amount of Rs 1, 00,097 lakh and a bond, the second child gets a bond with maturity amount of Rs 1, 00,052 lakh upon attaining 18 years of age. These children can also get educational loan and medical facilities using these bonds. The only condition is that the girl has to study in government school at least up to the VIII standard.

**5. Subsidy for seeds:**

The Department of Agriculture distributes seeds to small and marginal farmers with subsidy in all seasons. Small and marginal farmers can avail this benefit by producing the right documents (Land record documents / Pahani) from the Revenue Department.

**6. Subsidy for Machinery:**

With a view to spreading new technology, the demonstration of newly developed equipments is taken up through State Governments, ICAR and Central /State organizations. Efforts are on to improve the quality of agricultural equipments particularly those manufactured in the small scale sector, and development of human resource for promotion of new and hi-tech equipment for the benefit of small and marginal farmers. Emphasis is also on promotion of resource / residue management equipment, water and energy conservation equipment. Institutional credit is available to the farmers along with subsidy for the purchase of various identified equipments. The subsidy for machinery varies according to the type of machinery and program. For example, Tractor cultivator gets subsidy of 13.50 per cent.

**7. Midday meal scheme –** (Akshara Dasoha)

In this program mid day meal is offered to all children studying in classes I$^{st}$ to X$^{th}$ improving their nutritional status in Government, Government aided schools and anganawadi centres. The objectives of the scheme are to avoid classroom hunger, increase school enrolment, increase school attendance, improve socialization among different castes, address malnutrition, and empower women through employment and to avoid school drop-outs.

**8. Kaliyuva Makkalige Cycle**

This is one of the programmes implemented by the state government, mainly to attract the students to government schools and to avoid the drop outs, as the schools are located at a distance from home and are not well connected by public transport. The bicycle programme was implemented to increase school enrolment at the high school level. In this scheme, every student of VIII standard in Government and Government aided school will get a bicycle worth Rs. 2500. There is no distinction of BPL or APL family here.

**9. National Horticulture Mission:**

National Horticulture Mission is a programme formulated by GOI for the overall development of Horticulture sector in India. The main objective is to improve the production and productivity of Horticultural crops. It is a holistic approach covering all aspects of production post harvest technology and marketing. For example, about 50 per cent subsidy is given for floriculture.

**10. Swarna Jayanhi Sahari Rojgar Yojane (SJSRY)**

This scheme is sponsored by Central Government implemented by Ministry of Urban development for the State Government. Here beneficiary may be individual, community belonging to Below Poverty Line, Unemployed individuals. Here they are promoting formation of SHGs, and help in training, and offer funding support to the group for undertaking group work benefitting all people. Here members are eligible to receive loan subsidy of 50 percent from the SJSRY program. For example, about 33 per cent subsidy is provided to SHG for self employment.

**11. Mahathma Gandhi National rural employment guarantee act;**

MGNREGA is one of the Government of India sponsored programmes. The objective is to ensure livelihood and food security by providing unskilled work to people and to avoid the migration of people from rural area to urban area for livelihood and to provide a maximum of 100 days of employment to every rural poor farm family in a year, with a wage rate of Rs. 155 per wo/man day. The farm family irrespective of APL/BPL can derive this benefit after registering in Gram Panchayath office and should have the job card to be eligible under MGNREGA.

**12. Support price for milk**

State government gives a support price of Rs. two per liter over and above the price received by farmer for milk. This benefit is distributed to farmers through Milk dairy cooperatives. The milk cooperatives procure cattle feed at nominal price and distributes them to members.

**13. Dairy Entrepreneurship Development Scheme (DEDS);**

It implemented by Department of Animal Husbandry, Dairying and Fisheries, Government of India. NABARD is implementing this scheme through Commercial Banks, State Cooperative Banks, and Regional Rural Banks. The main objective of this scheme is to provide financial support to entrepreneurs / farmers to start dairy. The loan is for purchase of Cross bred cows, buffaloes (up to 10 animals): Rs.5 lakh. In this programme subsidy is given up to 25% (33.33% for SC/ST beneficiaries) of total outlay.

**14. Indira Awas Yojana**

It is a flagship scheme of the Ministry of Rural Development to provide houses to the poor in the rural areas. The main objective of the Indira Awas Yojana is to help construction of dwelling units of members of Scheduled Castes/Scheduled Tribes and other below the poverty line including non-SC/ST rural households by providing them a lump sum financial assistance.

The target groups for houses under the IAY are below poverty line households living in the rural areas belonging to Scheduled Castes/Scheduled Tribes and non-SC/ST BPL rural households, widows in rural areas (irrespective of their income criteria). About 60% of the total IAY allocation during a financial year should be utilized for construction of dwelling units for SC/ST, BPL households and about 40% of the total IAY allocation for non-SC/ST BPL rural households. About 3% of the outlay is devoted for physically and mentally challenged persons. The maximum benefit per beneficiary is Rs. 75000. The title to home site should be in the name of female in the family.

**15. Suvarna bhoomi yojana**

It is one of the Government of Karnataka implemented projects where there is direct payment of Rs. 10,000 to farm family in two installments of Rs. 5000 each to improve the livelihoods of small and marginal farmers enabling farmers to shift from low-value subsistence crops to high-value fruit and vegetable crops with sustainable management practices. In this scheme farmers are getting benefits like the financial assistance, scientific/ technical inputs, training, material inputs and forward market linkages etc.

**16. Nirmala Bharat Abhiyan Yojane - Toilet construction**

This is the scheme to promote sanitation and hygiene in the rural areas by construction of toilets for the beneficiaries. The Beneficiaries are selected by the grama panchayat. The Centre and state government subsidy is Rs 4,700 and Rs 4,500 provided under MGNREGA. The beneficiaries get a cheque for Rs 9,200 for construction of toilet for home.

**17. Vidya Vikasa Scheme – Enhancing educational opportunities for SC/ST children**

Under this scheme school children up to X$^{th}$ standard can benefit from free school bag, text books, note books and other benefits every year at the beginning of academic year. This programme is mainly meant for children belong to SC/ST families.

**18. Kishori shakti yojane**

Kishori Shakti Yojana (KSY) seeks to empower adolescent girls, so as to enable them to take charge of their lives. It is viewed as a holistic initiative for the development of adolescent girls. The Scheme helps to improve the nutritional, health and development status of adolescent girls, promote awareness of health, hygiene, nutrition, family care and helps them to going back to school.

### 3.2.C. Terminologies used in the study

1. **Forest Area:** Area under forests includes all lands classified as forests under any legal enactment dealing with forests or administered as forests, state-owned or private and whether wooded or maintained as potential forest land.

2. **Barren and uncultivable land:** This covers all barren and uncultivable land like mountains, deserts and similar type of land. Land, which cannot be brought under cultivation unless at a high cost is classified as uncultivable, whether such land is in isolated blocks or within cultivated holdings.

3. **Land put to non-agricultural uses:** This stands for all lands occupied by buildings, roads and railways or under water. Examples are rivers and canals and other land put to uses other than agriculture.

4. **Cultivable waste land:** These include all lands available for cultivation, whether not taken up for cultivation, or taken up for cultivation once but not cultivated during the current year and last five years or more in succession.

5. **Permanent pastures and other grazing lands:** These cover all grazing lands, whether they are permanent pastures and meadows or not; village common grazing lands are included under this head.

6. **Other fallow lands:** These include all lands, which were not taken up for cultivation for a period of not less than one year and not more than five years.

7. **Current fallow land:** This class comprises cultivated areas, which are kept fallow during the current year. If any seedling area is not cropped again in the same year, it may be treated as current fallow.

8. **Net cropped area:** This consists of net area sown with crops and orchards in particular season. Area sown more than once in the same year is counted only once.

9. **Total cropped area:** means the total area sown once and/or more than once during the year. i.e., the area is counted as many times as there are crops sowing in year. This total cropped area is also known as Gross cropped area or total area sown.

### 3.3 Analytical tools

#### 3.3.1. Factor Analysis

The two districts considered for the study are compared with regard to the cropping pattern, enterprise combination, technology (High Yielding Varieties), markets and its related infrastructural facilities. Comparison was made for the two time periods - Green Revolution (1969 to 1988) and Post Green Revolution (1989 to 2007).

The appropriate tool for analyzing the Meta data to identify the agricultural transformation through dimensions is the Factor Analysis (FA). FA is a multivariate technique that attempts to account for the co-relational pattern in a set of observed random variables in terms of a minimal number of unobservable or latent variables called Factors (Dimensions). Exploratory factor analysis is used to achieve the scientific parsimony by reducing a set of large number of variables to a convenient number of dimensions. Factor analysis assumes that the observed variables are the linear combination of some underlying dimensions. The factor loading of each variable in conjunction with the dimension, explains the variation in the corresponding variable.

Factor analysis model in matrix form can be represented as follows,

$$X_{(nxN)} = A_{(nxm)} \ \text{x} \ F_{(mxN)}$$

Where, 'X' is the matrix of variables

'A' is the matrix of factor loadings ($a_{ij}$)

'F' is the matrix of dimensions

$a_{ij}$ is the net correlation between $j^{th}$ dimension and $i^{th}$ observed variable

'N' is the number of districts (2) variables

'm' is the number of dimension and

'n' is the number of variables.

The basic requisite for the factor analysis is that the variables under consideration should be inter correlated. The variables which are least correlated with other variables has to be eliminated. Similarly the variables which have high correlation with other variable leading to problem of multicollinearity and singularity have to be eliminated. If the value of determinant of inter correlation matrix is greater than 0.00001 then it can be concluded that, there is no problem of multicollinearity and singularity. To test the sample adequacy, KMO (Keyser-Meyer-Olkin criteria has to be used. If the KMO statistics is above 0.7 then the model is considered to be adequate with the sample size. The number of factors or dimensions to be extracted depends on the Kaiser's condition of Eigen value more than 1 or it can be judged based on the screed plot technique. In order to extract the factors, principal component method can be used. Factors obtained from the unrotated extraction are not easily interpretable. To improve the interpretability of the factors varimax rotation has to be performed. This rotation maximizes the loadings of each variable on one factor and minimizes the loading of each variable on the remaining extracted factors.

Factor loading: refers to magnitude of association of each variable with the dimension. As the orthogonal rotation is chosen for extraction of dimension in factor analysis then the dimensions are independent and variables within the dimensions are interdependent.

### 3.3.2. Transition in agricultural transformation

The transition in agricultural transformation was assessed by estimating the transitional probabilities in land use at district level and in crop pattern at village level using the Markov Chain Analysis[7]. The transitional probability matrix describes the probability of movement from one state to the other over time. The off diagonal element $P_{ij}$ $(i \neq j)$, indicates the probability of the $i^{th}$ state moving to the $j^{th}$ state. While, the diagonal element $P_{ij}$, $(i=j)$, indicates the probability of retaining in the current state.

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[7] The Markov Chain analysis as used in S Angles, A Sundar and M Chinnadurai, Impact of Globabilization on production and export of Turmeric in India – An Economic analysis, Agricultural Economics Research Review, Vol 24, July-Dec 2-11, pp. 301-308 has been deployed using Lingo version 1989.

### 3.3.3. Sources of information and supply of new technology inputs and the markets for output in different crops

The tabular and percentage analysis were used to explain the results of the Sources of information and supply of new technology inputs and the markets for output in different crops

### 3.3.4. Marketable surplus

Marketable surplus = Total output – consumption for food, use as feed, loans if any in kind. The percentages of output sold to total output are calculated.

### 3.3.5. Economics of crops

The cost of production includes expenses on seed, labour charges (both hired and family labour), manure, fertilizers, plant protections, bullock labour (both hired and family). All the input prices are valued at prevailing prices in the locality for 2012. The costs of marketing the produce, irrigation cost, opportunity cost (5 per cent of variable cost), rental value of land, risk premium (2 per cent of variable), management cost (10 per cent of variable cost) are considered. The cost of establishment was included while calculating the cost of production for plantation crops. The output value includes both main product and the by-product of crops.

**3.3.5.1. Variable costs:** The variable costs include cost of seeds, manure, fertilizers, wages of human and bullock labour, machine labour, plant protection chemicals, marketing cost and irrigation cost.

**Seeds:** The cost of purchased seeds was based on the actual amount paid by the sample farmers.

**Farm yard manure:** The quantity of FYM used in the cultivation of paddy was measured in quintals. The cost was imputed at the market price in the village including cost of transportation and other incidental charges.

**Fertilizers and plant protection chemicals:** The cost of fertilizers and plant protection chemicals was based on the actual prices paid by the farmers including the cost of transportation and other incidental charges.

**Labour**: The cost of hired labour was calculated at the prevailing wage rates paid per day for Men, Women and Bullock labor and Machine labour. The cost of family labour, human, animal and machinery was calculated considering the prevailing market rate.

**Marketing costs:** Marketing expenses were calculated as actual expenses incurred on bagging, transportation and hamali charges.

**Amortized cost of irrigation well**

For farmers using groundwater, amortized cost of well is the annual variable cost component of irrigation water, as irrigation wells are prematurely failing in hard rock areas, rendering them as variable costs rather than as fixed costs. The amortized cost varies with the type of well, status of the well, year of construction, average age of well, and interest rate chosen.

Amortized cost of borewell = amortized cost of all working wells + amortized cost of all failed wells. Working wells are defined as those wells which are yielding water at the time of field data collection. Failed wells are those which yielded water and are no longer yielding groundwater. Amortization is made only for those wells whose life / age is below 10 years, considering them as variable capital. For those wells which worked beyond ten years, the amortization is not considered as they are considered as fixed investments.

Amortized cost of working borewell/s

$=[(\text{Compounded cost of working borewell/s})*(1+i)^{AL}*i] \ / \ [(1+i)^{AL}-1]$

Where, AL = current year of data collection <u>minus year of drilling for working borewell</u>

Compounded cost of working borewell =

$[(\text{establishment cost of working borewell})*(1+i)^{(\text{current year (2012) minus year of drilling borewell})}$

Amortized cost of failed borewell =

$[(\text{Compounded cost of borewell})*(1+i)^{AL}*i] \ / \ [(1+i)^{AL}-1]$

Here, AL = current year <u>minus year of failure for failed borewell</u>

Compounded cost of failed borewell =

$[(\text{establishment cost of failed borewell})*(1+i)^{(\text{current year (2012) minus year of construction})}$.

Irrigation cost per acre inch of groundwater = amortized cost of working well(s) + amortized cost of failed well(s) divided by the number of acre inches of groundwater extracted

**Irrigation Cost** for water buyers = 1/3 or ¼ of the gross return of the crop cultivated by water-buyer as charged by water seller.

**Interest on working capital:** The working capital consists of the expenditure on seeds, labour, farm yard manure, chemical fertilizers and plant protection chemicals. Interest on operational capital was calculated at the rate of 5 per cent per annum for the duration of the crop.

**Management cost:** It was imputed by taking the 10 per cent of variable cost.

**Rental value of land:** It is imputed by taking the prevailing rent in the study area per acre for the duration of the crop.

**3.3.5.3. Total cost of cultivation:** It is the sum of all costs on per acre basis

**Gross returns:** The gross returns are computed by multiplying the quantity of main product and by-product obtained with respective prices received.

Gross returns = quantity of product X market price and + quantity of by-product X market price

**Net returns =** Gross return - total cost of cultivation

**Per Capita Income** = Total income from different enterprises divided by total population of sample households

**Per Acre Income** = Total income from different enterprises divided by total size of land holding by sample households

**3.3.7. Water use for each crop**

The water applied for a particular crop in the season is estimated as

Water applied for a crop (acre-inches)
= (average yield of the well in GPH X number of hours per irrigation X frequency of irrigation per month X number of months of crop) / 22611gallons gives the water extracted for each crop in acre inches.

### 3.3.10. Measures of Averages and Percentages

The magnitude of benefit from the governmental programmes/ schemes are presented along with the percentage of families receiving the benefit under each program in the study villages of Tharati and Belladamadagu in Tumkur district and Kappanimbargi and Markabinahalli in Bijapur district. Percentages are calculated for results to be comparable. Average and percentage were used to examine benefits availed by farmers from development programs along with transaction costs involved in availing the benefit.

### 3.3.11. Amortization of benefit availed from Government programs

Some of the Governmental programs like drought relief fund, loan waives, subsidy for farm machinery extends benefits over time. Thus, benefit for such beneficiaries is amortized using the rule.

$$A = P\,\frac{r(1+r)^n}{(1+r)^n-1}$$

Where,

A= Amortized benefit per year from Governmental programs

P= Total initial benefit received by beneficiary

r= Interest rate per period, r is taken as 2 per cent since the benefits are from social welfare schemes over a long period of time

n= Total number of years of benefit flow, n is the total number of years for each program

(for e.g. drought relief fund and loan waive are 10 years as the area prone to drought is once in 10 years, subsidy for farm machinery is for 10 years, the Bicycle scheme for school going children is considered for 10 years, since 10 years is the optimum economic life of any machinery or building and hence 10 years period is considered for amortization.

Suvarna bhumi Yojane is for 5 years and rinderpest vaccination is for 5 years, Yashaswini health insurance program is for 10 years).

### 3.3.12. Transaction cost involved in availing the benefit

Transaction cost concept used in this study is the cost involved in gathering information regarding the Government schemes or program including whether the farmer is eligible to receive benefits in any specific program, the cost of preparing documents and submitting them to the concerned office, and the rent seeking (bribe if any) paid in order to receive the benefit from the Government schemes/program. This is akin to the Information cost (Travel cost), contractual cost (cost of documents) and enforcement cost (rents paid, cost of follow up) as enunciated by Ronald Coase (The problem of Social cost, 1960, The Journal of Law and Economics). It involves cost of obtaining information, establishing one's bargaining position, bargaining and arriving at a group decision and enforcing the decision made (Allan Randall, 1982).

Transaction costs are the costs above the price of the resource involved during exchange. In the context of Government schemes/ programmes benefiting farmers, Transaction costs refers to the costs incurred by farmer in receiving the benefit from government schemes/ programmes, and it comprises of cost incurred by farmer in submitting the application, necessary documents to be produced along with the application for a Government schemes/programmes, Time spent by farmer in availing the benefit i.e. it is calculated in terms of opportunity cost of labour and amount of rents paid to different officials, middlemen's and local leaders to avail the benefit. In this study transaction cost of farmers is the opportunity cost foregone time by the farmers measured in terms of wage rate per day including the managerial cost as followed while estimating the cost of the farmers involved in the CACP (commission for agriculture costs and prices). Wage rate is taken as

Rs.125/day prevailing in the study area and 10 percent towards the managerial cost and other transaction costs paid out by farmer are rents (bribes) to the officials, middlemen, local leaders. Other costs involved in applying for Government schemes/programmes like, documents to be given along with application form. Information costs include time spent by the farmers in availing information regarding Government schemes/ programmes, visits to line Department to seek information.

# RESULTS

# CHAPTER IV

# RESULTS

This study deals with the economic analysis of agricultural transformation process in Karnataka towards inclusive growth based on field data and secondary data. The results are presented as under:

4.1 Assets of sample farmers

4.2 Socio-Economic features of sample farmers

4.3 Cropping pattern

4.4 Dimensions of agriculture growth in Bijapur and Tumkur districts of Karnataka (results from factor analysis)

4.5 Transitional probabilities of Land use and cropping pattern in Tumkur and Bijapur districts of Karnataka (Markov chain analysis)

4.6 Transitional probabilities of cropping pattern of sample farmers (results from Markov chain analysis of secondary data)

4.7 Sources of information and supply of new technology inputs and the markets for different crops

4.8 Marketable surplus of sample farmers

4.9 Costs and return structure of sample farmers

4.10 Relative economic performance of the most vulnerable rainfed areas in Northern and Southern Karnataka (Rs.)

4.11 Transaction cost and benefits of sample farmers from development programs

5.12 Water market in Tharati

## 4.1 Assets of sample farmers

The number of households in “Grapes Based Farming System” (GBFS) Kappanimbargi village was 250 during 2000 and it had increased to 320 in 2010. In the case of livestock, around 25 per cent, 14 per cent and 40 per cent of indigenous cow, buffalo and bullock respectively were showing the decreasing trend but the number of tractors increased by 10 per cent per year. The number of mobile phones enormously increased at the rate of around 1500 per cent per year while TV sets increased by 590 per cent per year. The number of pucca houses increased by 8.3 per cent per year but that of kachcha and thatched houses were decreased by 4.2 per cent and 7.5 per cent per year, respectively. The number of bore wells increased by 32 per cent per year but functioning open wells reduced by 6 per cent per year.

The number of household in “Diversified Farming System with a Combination of Food and Commercial Crops” (DFSCFCC) Markabbinahalli village was 300 during 2000 and increased to 392 in 2010. In the case of livestock, possession of all livestock decreased over the period 2000 - 2010. The tractors increased by 40 per cent per year and the number of TV sets increased by 174 per cent per year.

The number of households in “Floriculture Based Farming System with Groundwater Markets” (FBFSGM) Tharati village, the number of households increased at the rate of 7.2 percent per year between 2000 and 2010. Among bovine animals, the indigenous cows which formed 30 per cent of the total in 2000, formed 26 per cent in 2010. The number of cross breed cows which formed 1 percent of the bovine population in 2000, accounted for 11 percent in 2010. The indigenous cows reduced by 2.8 per cent per year and buffaloes by 3.4 per cent per year from 2000 to 2010. The number of auto rickshaws, tractors and TV sets increased considerably. The Pucca houses were increased by 27 per cent per year. The number of bore wells increased by 28% and functioning open wells reduced by 8.4 % per year between the two periods.

The number of households in “Groundnut Based Farming System with Dairy as Main Enterprise” (GBFSD) Belladamadugu village was 190 during 2000 and increased to 276 in 2010 with an increase of 4.5 per cent per year. Among the livestock, the population of indigenous cows increased more than the cross breed cows. However, the number of bullocks in the village reduced by 9.3 percent per year and buffaloes by 5 percent per year in the period between 2010 and 2000. Milk sale increased by 180 litre per day in 2000 to 500 litres per day in 2010, an increase of 17.8 percent per year. Tractors increased by 30 percent per year while the bullock carts reduced by 8.6 per cent per year. The number of mobile phones enormously increased at the rate of around 500 percent per year while TV sets increased by 154 percent per year. The number of bore wells increased by 164 percent per year and functioning open wells reduced by 8.3 per cent per year.

### 4.2 Socio-Economic features of sample farmers

The socio-economic features of the sample farmers in Most Vulnerable Rainfed Area in North Karnataka (MVRANK) Bijapur district are in Table 4.2. In GBFS Kappanimbargi village, about 71 per cent of irrigated farmers were literate whereas it was 39 per cent in the case of rainfed farmers. The literacy rate was 73 per cent of rainfed farmers in DFSCFCC Markabbinahalli village. The average age of family head was 53 and 42 for rainfed farmers and farmers with irrigation facility respectively while it was 50 years for rainfed farmers in DFSCFCC Markabbinahalli. It was observed that the average family size was five for sample farmers in MVRANK Bijapur district. Around 60 per cent of bovine animals were buffaloes and 40 per cent of indigenous cows possessed by farmers with irrigation facility. In the case of GBFS Kappanimbargi, about 54 per cent of bovine animals were indigenous cows followed by 39 per cent buffalo and 7 per cent bullocks possessed by rainfed farmers. About 53 per cent, 27 per cent and 20 per cent of indigenous cow, buffalo and bullocks respectively were possessed by farmers in DFSCFCC Markabbinahalli village. The land value per acre was Rs. 8 lakhs for farms with irrigation facility and Rs. 3.37 lakhs for rainfed land in GBFS Kappanimbargi village while in the case of DFSCFCC Markabbinahalli village, the land value per acre was Rs. 4.2 lakhs for rainfed land.

The socio-economic features of the sample farmers in Most Vulnerable Rainfed Area in South Karnataka (MVRASK) Tumkur districts are in Table 4.1. In FBFSGM Tharati village 50 per cent of rainfed farmers are literate, while 67 per cent of farmers buying irrigation water and farmers with irrigation facility were literate. The literacy rate was the highest (83 %) for farmers with irrigation facility compared to rainfed farmers in GBFSD Belladamadugu. The average age of family head is 57, 53 and 53 for rainfed farmers, farmers buying irrigation water and farmers with irrigation facility respectively while it was 54 per cent, 51 per cent for rainfed farmers and farmers with irrigation facility respectively. About 38% of bovine animals were indigenous cows possessed by rainfed farmers and 31 percent were cross breed cows. About 44% of bovine animals were indigenous cows possessed by farmers with irrigation facility and 22 percent were cross breed in FBFSGM Tharati village. The land value per acre was Rs. 7 lakhs for farms with irrigation facility followed by Rs.3 lakhs per acre for farms buying irrigation water and Rs. 2.3 lakhs per acre for rainfed farms in FBFSGM Tharati village. In GBFSD Belladamadugu village the land value per acre was Rs.3.5 lakhs for farms with irrigation facility and Rs. 1.3 lakhs per acre for rainfed farms.

### 4.3 Cropping pattern

The cropping pattern of sample farmers in MVRANK Bijapur district is shown in Tables 4.3 and 4.4. About 49 % of area was for *rabi*

**Table 4.1: Classification of sample farmers in MVRANK Bijapur district**

| Sl No. | Particulars | GBFS Kappanimbargi village | | DFSCFCC Markabbinahalli village |
|---|---|---|---|---|
| | | Rainfed farmers (n=23) | Irrigated farmers (n=7) | Rainfed farmers (n=30) |
| **1** | Family size(No.) | 5 | 5 | 5 |
| **2** | Age of the family head(Year) | 53 | 42 | 50 |
| **3** | **Literacy of farmers** | | | |
| | Literate | 9 (39) | 5 (71) | 22 (73) |
| | Illiterate | 14 (61) | 2 (29) | 8 (27) |
| | Total | 23 (100) | 7 (100) | 30 (100) |
| **4** | **Size of holding(acres)** | 6.2 | 11.14 | 11.85 |
| **5** | **Households possessing Livestock** | | | |
| | Bullock (Number) | 2 (7.14) | 0 (0) | 3 (20.00) |
| | Indigenous cow (Number) | 15 (53.57) | 2 (40.00) | 8 (53.33) |
| | Buffalo (Number) | 11 (39.29) | 3 (60.00) | 4 (26.67) |
| | Total | 28 (100) | 5 (100) | 15 (100) |
| | Goat (Number) | 29 | 5 | 16 |
| **6** | **Number of households possessing farm inventory/assets** | | | |
| | Bullock pair | 1 | 0 | 7 |
| | Tractor | 1 | 2 | 0 |
| | Two wheeler | 3 | 1 | 2 |
| | Four wheeler | 0 | 2 | 1 |
| **7** | **Land value per acre (Rs. in Lakh)** | 3.37 | 8.36 | 4.23 |

Source: Primary data.
Note: Figures in parentheses indicate percentage to total.

**Table 4.2: Classification of sample farmers in MVRASK Tumkur district**

| Sl No. | Particulars | FBFSGM Tharati village | | | GBFSD Belladamadugu village | |
|---|---|---|---|---|---|---|
| | | Rainfed farmers (n=18) | Water buyers (n=3) | Irrigated farmers (n=9) | Rainfed farmers (n=24) | Irrigated farmers (n=6) |
| **1** | Family size (No.) | 4 | 5 | 6 | 5 | 5 |
| **2** | Age of the family head (Year) | 57 | 53 | 53 | 54 | 51 |
| **3** | **Literacy of farmers** | | | | | |
| | Literate | 9 (50) | 2 (67) | 6 (67) | 15 (62) | 5 (83) |
| | Illiterate | 9 (50) | 1 (33) | 3 (33) | 9 (38) | 1 (17) |
| | Total | 18 (100) | 3 (100) | 9 (100) | 24 (100) | 6 (100) |
| **4** | **Size of holding(acres)** | 0.97 | 2.17 | 2.03 | 3.23 | 6.23 |
| **5** | **Households possessing Livestock** | | | | | |
| | Bullock (Number) | 0 (0) | 0 (0) | 4 (22.22) | 2 (6.90) | 2 (12.50) |
| | Indigenous cow (Number) | 5 (38.46) | 0 (0) | 8 (44.44) | 2 (6.90) | 2 (12.50) |
| | Cross breed cow (Number) | 4 (30.77) | 0 (0) | 4 (22.22) | 22 (75.86) | 12 (75.0) |
| | Buffalo (Number) | 4 (30.77) | 3 (100) | 2 (11.11) | 3 (10.34) | 0 (0.00) |
| | Total | 13 (100) | 3 (100) | 18 (100) | 29 (100) | 16 (100) |
| | Sheep (Number) | 2 | 0 | 0 | 0 | 0 |
| | Goat (Number) | 12 | 0 | 7 | 6 | 9 |
| **6** | **Number of households possessing farm inventory/assets** | | | | | |
| | Bullock pair | 0 | 0 | 0 | 1 | 1 |
| | Tractor | 0 | 0 | 1 | 0 | 0 |
| | Two wheeler | 1 | 0 | 5 | 6 | 3 |
| **7** | **Land value per acre (Rs. in Lakh)** | 2.36 | 3 | 7.33 | 1.28 | 3.5 |

Source: Primary data. Note: Figures in parentheses indicate percentage to total.

**Table 4.3: Cropping pattern in GBFS Kappanimbargi, 2012-13**

n=30

| Sl. No. | Crops | Season | Area (Acres) | Per cent to total |
|---:|---|---|---:|---:|
| 1 | Bajra | Kharif | 32.68 | 19.18 |
| 2 | Groundnut | Kharif | 10 | 5.87 |
| 3 | Redgram | Kharif | 18 | 10.57 |
| 4 | Sorghum | Rabi | 83.19 | 48.83 |
| 5 | Wheat | Rabi | 0.5 | 0.29 |
| 6 | Bengalgram | Rabi | 1 | 0.59 |
| 7 | Sugarcane | Annual | 1 | 0.59 |
| 8 | Grape | Perennial | 19 | 11.15 |
| 9 | Ber | Perennial | 3 | 1.76 |
| 10 | Pomegranate | Perennial | 1 | 0.59 |
| | Gross cropped area | | 169.37 | 99.41 |

Source: Primary data.

**Table 4.4: Cropping pattern in DFSCFCC Markabbinahalli, 2012-13**

n=30

| Sl. No. | Crops | Season | Area (Acres) | Per cent to total |
|---:|---|---|---:|---:|
| 1 | Redgram | Kharif | 96 | 34.44 |
| 2 | Cotton | Kharif | 42 | 15.07 |
| 3 | Sunflower | Kharif | 2.5 | 0.90 |
| 4 | Jowar | Rabi | 40.25 | 14.44 |
| 5 | Wheat | Rabi | 14.5 | 5.20 |
| 6 | Bengalgram | Rabi | 75.5 | 27.09 |
| 7 | Safflower | Rabi | 8 | 2.87 |
| | Gross cropped area | | 278.75 | 100.00 |

Source: Primary data.

sorghum while bajra (19 %), redgram (11 %), groundnut (6 %) were *Kharif* crops cultivated by farmers in GBFS Kappanimbargi village. Grapes were grown as perennial crops on 11 % of the total area. In DFSCFCC Markabbinahalli village, redgram (34 %) and cotton (15 %) were major *Kharif* crops while bengalgram (27 %), sorghum (14 %), wheat (5 %) and safflower (3 %) were *rabi* crops.

The cropping pattern of sample farmers in FBFSGM Tharati village (Table 4.5) indicated that ragi (60 %), maize (8 %), chrysanthemum (5 %), groundnut (4.8 %), paddy (3.4 %), redgram (2.7 %) and horsegram (0.7 %) are *kharif* crops. Chrysanthemum (4.5 %), paddy (1.4 %) were *summer* crops and perennial crops were arecanut (8 %) and jasmine (1 %). The cropping pattern of sample farmers in GBFSD Belladamadugu village (Table 4.6) depicted that groundnut (51 %), ragi (18 %), sorghum fodder (14 %), paddy (5 %), horsegram(2.8 %), maize fodder (2.8 %), maize (2.3 %), redgram (0.9%) were important *kharif* crops. Chrysanthemum crop was cultivated (0.11 %) in summer and perennial crop arecanut (2.3 %).

## 4.4 Dimensions of agriculture growth in Bijapur and Tumkur districts of Karnataka

### Dynamics of agriculture in MVRANK Bijapur district

**Comparison of districts:** The MVRANK (Bijapur district) is compared with MVRASK (Tumkur district) with regard to cropping pattern, enterprise combination, technology (High Yielding Varieties), markets and infrastructural facilities. The information on institutions and governance are not considered due to non availability of data. Comparison is made for the two time periods, defined as Green Revolution (1969 to 1988) and Post Green Revolution (1989 to 2007).

**Table 4.5: Cropping pattern in FBFSGM Tharati, 2012-13**

n=30

| Sl. No. | Crops | Season | Area (Acres) | Per cent to total |
|---|---|---|---|---|
| 1 | Ragi | Kharif | 21.98 | 60.47 |
| 2 | Paddy | Kharif | 1.25 | 3.44 |
| 3 | Maize | Kharif | 2.75 | 7.57 |
| 4 | Horsegram | Kharif | 0.25 | 0.69 |
| 5 | Redgram | Kharif | 1 | 2.75 |
| 6 | Groundnut | Kharif | 1.75 | 4.81 |
| 7 | Chrysanthemum | Kharif | 1.98 | 5.45 |
| 8 | Paddy | Summer | 0.5 | 1.38 |
| 9 | Chrysanthemum | Summer | 1.62 | 4.46 |
| 10 | Jasmine | Perennial | 0.37 | 1.02 |
| 11 | Arecanut | Perennial | 2.9 | 7.98 |
| | Gross cropped area | | 36.35 | 100.00 |

Source: Primary data.

**Table 4.6: Cropping pattern in GBFSD Belladamadugu, 2012-13**

n=30

| Sl. No. | Crops | Season | Area (Acres) | Per cent to total |
|---|---|---|---|---|
| 1 | Ragi | Kharif | 19.75 | 18.35 |
| 2 | Paddy | Kharif | 5.25 | 4.88 |
| 3 | Maize | Kharif | 2.5 | 2.32 |
| 4 | Horsegram | Kharif | 3 | 2.79 |
| 5 | Redgram | Kharif | 1 | 0.93 |
| 6 | Groundnut | Kharif | 55 | 51.11 |
| 7 | Maize fodder | Kharif | 3 | 2.79 |
| 8 | Sorghum fodder | Kharif | 15.5 | 14.40 |
| 9 | Chrysanthemum | Summer | 0.12 | 0.11 |
| 10 | Arecanut | Perennial | 2.5 | 2.32 |
| | Gross cropped area | | 107.62 | 100.00 |

Source: Primary data.

**Dimensions 1: Market and irrigation supported farming**

The factor loadings and dimensions in Green revolution period (1969 to 1988) for MVRANK Bijapur district are given in Table 4.7. The first dimension named as Market and irrigation supported farming explained the maximum variation of 48 percent. The variables having factor loadings with this dimension are sugar cane Area 0.96; consumption of Nitrogen, phosphorus and potash fertilizers 0.95; road length 0.94; maize area 0.94; net irrigated area by canals and tanks 0.88; chickpea area 0.83; sunflower area 0.82; net irrigated area by open wells and bore wells 0.81; safflower area 0.81; cotton area -0.81; area under high yielding varieties 0.80; vegetables area 0.77, since the variables such as road length, surface irrigation contributes substantially to growth, this dimension is named as Market and Irrigation Supported Farming. However, cotton crop is negatively associated with the first dimension since, cotton is grown as rain fed crop though it is cultivated as irrigated crop in other areas. Policies related to infrastructure and irrigation need to be strengthened in the Bijapur district.

**Dimensions 2: Rain fed Agriculture:** The second dimension named as 'Rain fed agriculture' explained 19 per cent of the variation in agriculture. The variables playing a dominant role here are pigeonpea area 0.86; groundnut area 0.84; pearl millet area 0.68; annual rainfall (in mm) 0.63; wheat area 0.49; sorghum area 0.30. It is important to note that in this dimension almost all factor loadings represent the rain fed agriculture since rainfall is largely contributing to this dimension.

**Table 4.7: Factor loadings and dimensions in Green Revolution (1969 to 1988) period for MVRANK Bijapur district**

| Variable | Level of variable in 1988 | Dimension 1: Market and irrigation supported farming | Dimension 2: Rainfed Agriculture |
|---|---|---|---|
| Sugar cane area ('000 ha) | 26 | 0.96 | |
| NPK fertilizer consumption ('000 tonnes) | 35 | 0.96 | |
| Fruit area ('000 ha) | 5 | 0.94 | |
| Road length ('000 Kms) | 7 | 0.94 | |
| Maize area ('000 ha) | 47 | 0.94 | |
| Surface water irrigation area ('000ha) | 74 | 0.88 | |
| Chickpea area ('000 ha) | 34 | 0.82 | |
| Sunflower area ('000 ha) | 109 | 0.82 | |
| ground water irrigation area ('000 ha) | 104 | 0.81 | |
| Safflower area ('000 ha) | 45 | 0.81 | |
| Cotton area ('000 ha) | 68 | -0.8 | |
| High Yielding Varieties area ('000 ha) | 193 | 0.8 | |
| Vegetables area ('000 ha) | 17 | 0.78 | |
| Pigeon pea area ('000 ha) | 33 | | 0.86 |
| Ground nut area ('000 ha) | 124 | | 0.84 |
| Pearl millet area ('000 ha) | 115 | | 0.68 |
| Rainfall (in mm) | 617 | | 0.64 |
| Wheat area ('000 ha) | 65 | | 0.48 |
| Sorghum area ('000 ha) | 551 | | 0.3 |
| Total variation explained (%) | | 0.48 | 0.19 |

Source of data for factor analysis: district level data for 1969 to 1988 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Period II: Post green revolution**

**Dimension 1: Technology lead groundwater agriculture**

The factor loadings and dimensions in post green revolution period (1989 to 2007) for MVRANK Bijapur district are in Table 4.8. The first dimension is named as Technology lead groundwater agriculture which explains the maximum variation of about 55 percent. The variables having high factor loadings with this dimension are consumption of nitrogen, phosphorus and potash fertilizers 0.94; net irrigated area by open wells and bore wells 0.93; Safflower area -0.86; chickpea area 0.86; area under high yielding varieties 0.81; sorghum area -0.80; cotton area -0.76; sugar cane area 0.73; maize area 0.71; wheat area 0.69; vegetables area 0.65; sunflower area 0.30. Application of fertilizers was higher in Post Green Revolution with the increase in use of groundwater irrigation and crops grown under irrigated condition. High yielding varieties require more water and fertilizers than local varieties. Hence, high yielding varieties are positively associated with fertilizer consumption and groundwater irrigation. In post green revolution period (1989 to 2007) farmers adopted different technologies like use of drip irrigation system in Grape, pomegranate and sugar cane. In the first dimension, some of the crops were negatively associated with factor loadings because safflower, sorghum and cotton are rain fed crops in Bijapur district. Developmental programs which are facilitating efficient use of groundwater need to be implemented.

**Dimension 2: Surface irrigation lead agriculture:** The second dimension is named as 'Surface irrigation lead agriculture' and explains 16 per cent of the variation in the growth dynamics of agriculture in Bijapur. The variables playing a dominant role in this second dimension were pearl millet area 0.79; groundnut area 0.78; pigeonpea area 0.72; net irrigated area by canals and tanks 0.71; road length 0.57; annual

**Table 4.8: Factor loading and dimensions in Post Green Revolution (1989 to 2007) period for MVRANK Bijapur district.**

| Variable | Level of variable in 2007 | Dimension 1: Technology lead ground water agriculture | Dimension 2: Surface irrigation lead agriculture |
|---|---|---|---|
| Fertilizer (‘000 tonnes) | 109 | 0.95 | |
| Ground water irrigation area (‘000 ha) | 274 | 0.94 | |
| Fruit area (‘000 ha) | 24 | 0.91 | |
| Chickpea area (‘000 ha) | 151 | 0.85 | |
| Safflower area (‘000 ha) | 10 | -0.83 | |
| High Yielding Varieties area (‘000 ha) | 647 | 0.83 | |
| Sorghum area (‘000 ha) | 361 | -0.80 | |
| Maize area (‘000 ha) | 123 | 0.76 | |
| Cotton area (‘000 ha) | 7 | -0.76 | |
| Wheat area (‘000 ha) | 94 | 0.74 | |
| Vegetables area (‘000 ha) | 35 | 0.70 | |
| Sugar cane area (‘000 ha) | 113 | 0.68 | |
| Pigeon pea area (‘000 ha) | 83 | 0.67 | |
| Sunflower area (‘000 ha) | 238 | | |
| Ground nut area (‘000 ha) | 107 | | 0.83 |
| Pearl millet area (‘000 ha) | 167 | | 0.81 |
| Surface water irrigation area (‘000 ha) | 125 | | 0.68 |
| Rainfall (in mm) | 540 | | 0.54 |
| Road length area (‘000 Kms) | 16 | | 0.52 |
| Total variation explained (%) | | 55 | 16 |

Source of data for factor analysis: district level data for 1989 to 2007 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

rainfall 0.50. It is important to note in this dimension that surface water irrigation area is positively associated with factor loadings since lift irrigation projects are introduced in Bijapur district. Hence, surface irrigation played a crucial role in Bijapur's agriculture.

**Dynamics of agriculture in MVRASK Tumkur district**

**Dimension 1: Infrastructure lead agriculture**

Factor loadings and dimensions in Green Revolution (1969 to 1988) for Tumkur district is given Table 4.9. The first dimension is named as 'Infrastructure lead agriculture' explains variation of about 34 percent. The variables having high factor loadings with this dimension are road length 0.92; groundnut 0.91; fruit crop area 0.90; Total consumption of Nitrogen, phosphorus and potash fertilizers 0.86; fodder 0.86; sorghum area -0.61; maize area 0.60. This dimension can be named as infrastructure lead agriculture, since, road connection has shown a positive improvement in transportation. Government policies help in the improvement of road connection to unconnected villages through Pradhan Mantri Gram Sadak Yojana and will help farmers to grow the high valued crops like fruit crops. Hence, sorghum is negatively associated with the factor loadings of first dimension.

**Dimension 2: Technology lead agriculture**

The second dimension is named as 'Technology lead agriculture' which explains 21 per cent of the variation in the dynamics of agriculture in Tumkur district. The variables playing a dominant role in this dimension are area under high yielding varieties 0.92; rice area 0.87; sugar cane area 0.70; net irrigated area by canals and tanks 0.60; Annual rainfall 0.50. It is important to note in this dimension that most factor loadings are high yielding varieties, rice and sugar cane where technologies play an important role.

**Table 4.9: Factor loading and dimensions in MVRASK Green Revolution (1969 to 1988) for Tumkur district**

| Variable | Level of variable in 1988 | Dimension 1: Infrastructure lead agriculture | Dimension 2: Technology lead agriculture | Dimension 3: Diversified agriculture supported by ground water |
|---|---|---|---|---|
| Road length (‘000Kms) | 7 | 0.92 | | |
| Ground nut area (‘000 ha) | 159 | 0.91 | | |
| Fruits area (‘000 ha) | 5 | 0.90 | | |
| NPK fertilizers area (‘000 tonnes) | 31 | 0.86 | | |
| Fodder area (‘000 ha) | 15 | 0.86 | | |
| Sorghum area (‘000 ha) | 19 | -0.61 | | |
| Maize area (‘000 ha) | 6 | 0.60 | | |
| High Yielding Varieties area (‘000 ha) | 59 | | 0.92 | |
| Rice area (‘000 ha) | 61 | | 0.87 | |
| Sugar cane area (‘000 ha) | 3 | | 0.69 | |
| Surface irrigation area (‘000 ha) | 57 | | 0.60 | |
| Rainfall (in mm) | 954 | | 0.56 | |
| Pigeon pea area (‘000 ha) | 11 | | | 0.86 |
| Finger millet area (‘000 ha) | 186 | | | 0.78 |
| Vegetables area (‘000 ha) | 1 | | | 0.58 |
| Ground water irrigation area (‘000 ha) | 39 | | | 0.52 |
| Total variation explained (%) | | 34 | 21 | 18 |

Source of data for factor analysis: district level data for 1969 to 1988 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

**Dimension 3: Diversified agriculture supported by groundwater**

The third dimension is named as 'Diversified agriculture' supported by groundwater and it explains 18 per cent of the variation in the dynamics of agriculture. The variables playing a dominant role in this dimension are pigeon pea area (with a factor loading of 0.86); finger millet area (0.78); vegetables area (0.58); net irrigated area by open wells and bore wells (0.52). Groundwater is positively associated with factor loadings of third dimension and it helps to cultivate diverse types of vegetables and irrigated crops. Hence, the third dimension is named as diversified agriculture supported by groundwater.

**Period II: Post green revolution**

**Dimension 1: Groundwater supported high value crops**

Details of factor loadings and dimensions in Post Green Revolution (1989 to 2007) for Tumkur district are given in Table 4.10. The first dimension coined as 'groundwater supported high value crops' explained variation of about 35 percent. The variables having factor loadings with this dimension are groundwater irrigation (net irrigated area by wells and bore wells) 0.96; fruit crop area 0.95; maize area 0.87; sorghum area -0.87; vegetables area 0.83; sugar cane area -0.62; area under High Yielding Varieties 0.51. This dimension is named as 'groundwater supported high value crops' because of adoption of high value horticultural crops like vegetables and fruit crops which are grown with the help of groundwater irrigation. Use of groundwater irrigation also facilitates growing of maize and high yielding varieties of crops. The area under sorghum is negatively associated with the first dimension because it is a rain fed crop.

**Dimension 2: Slow growth crops**: The second dimension named as 'slow growth crops' explains 19 per cent of variation in the dynamics of

**Table 4.10: Factor loading and dimensions in Post Green Revolution (1989 to 2007) for MVRASK Tumkur district**

| Variable | Level of variable in 2007 | Dimension 1: Ground water supported high value crops | Dimension 2: Slow growth crops | Dimension 3: Irrigated agriculture |
|---|---|---|---|---|
| Ground water irrigation area (‘000 ha) | 122 | 0.95 | | |
| Fruits area (‘000 ha) | 18 | 0.95 | | |
| Maize area (‘000 ha) | 21 | 0.87 | | |
| Sorghum area (‘000 ha) | 2 | -0.87 | | |
| Vegetables area (‘000 ha) | 2 | 0.83 | | |
| Sugar cane area (‘000 ha) | 2 | -0.62 | | |
| HYV area (‘000 ha) | 239 | 0.51 | | |
| Finger millet area (‘000 ha) | 197 | | 0.82 | |
| Ground nut area (‘000 ha) | 159 | | 0.82 | |
| Pigeon pea area (‘000 ha) | 14 | | 0.75 | |
| Fodder area (‘000 ha) | 13 | | -0.72 | |
| Rice area (‘000 ha) | 30 | | | 0.93 |
| Surface irrigation area (‘000 ha) | 26 | | | 0.92 |
| Rainfall (in mm) | 624 | | | 0.71 |
| NPK fertilizers (‘000 tonnes) | 36 | | | 0.61 |
| Road length (‘000Kms) | 14 | | | 0.47 |
| Total variation explained (%) | | 35 | 19 | 19 |

Source of data for factor analysis: district level data for 1989 to 2007 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

agriculture in Tumkur district. The variables playing a dominant role in this dimension are finger millet area 0.82; groundnut area 0.82; pigeon pea area 0.75; fodder area -0.72. In this dimension almost all factor loadings are in rain fed agriculture, since, finger millet, groundnut, pigeon pea are rain fed crops which are also slow growth crops and the fodder crop is negatively associated with factor loadings of second dimension.

**Dimension 3: Irrigated agriculture**

The third dimension named as 'irrigated agriculture' explained 19 per cent of the variation in the growth dynamics of agriculture. The variables playing a dominant role in this dimension are rice area 0.93; net irrigated area by canals and tanks 0.92; annual rainfall 0.71; total consumption of nitrogen, phosphorus and potash fertilizers 0.60; road length 0.47. Rice is an irrigated crop and it requires fertilizers. Rice has a higher factor loading of a variable in the third dimension and its association with that dimension will be larger than with other dimensions. Rice is positively associated with the surface water irrigation. Hence, the third dimension is named as 'irrigated agriculture' in Tumkur district.

The policies related to infrastructure and irrigation needs to be strengthened in Bijapur district. Developmental programs facilitating efficient use of groundwater need to be implemented in Bijapur district. The road infrastructure needs to be developed for widening market in Tumkur district. The efficient use of groundwater irrigation for high value crops to slow growth crops in Tumkur district.

## 4.5 Transitional probabilities of Land use and cropping pattern in Bijapur and Tumkur districts of Karnataka using Markov chain analysis (macro data)

**Land use pattern dynamics in MVRANK Bijapur**

In the green revolution period (1969 to 1988), the probability of movement of current fallow land towards net cropped area was the highest (0.99) (Table 4.11). This indicated that during green revolution there were several macro developmental programs such as 'Grow More Food Campaign' which facilitated farmers to cultivate even marginal and sub marginal lands. In addition, the probability of current fallow virtually reduced to zero. This situation during the post green revolution period (1989 to 2007) (Table 4.12) has distinctly undergone changes. The probability of the current fallow land to move to net cropped area (0.48) is lower or almost equal to the probability of current fallow land to be retained as current fallow land (0.51).

**Land use pattern dynamics in MVRASK Tumkur**

The probability of transition from forest to other cultivated land was 0.96. Thus, Tumkur lost forest land to crop cultivation. The probability of land not available for cultivation in transition to net cropped area was impressive (0.70). Similarly the current fallow land in transition to net cropped area (0.63) and retention of net cropped area (0.5) are the other highlights of the dynamics during the green revolution period (Table 4.13).

In the post green revolution period due to forest conservation act and national forest policy, the probability of retention of forest land was substantial (0.96) (Table 4.14).

**Table 4.11: Transitional probabilities of Land use in MVRANK Bijapur district in Northern Dry Zone of Karnataka during Green Revolution Period (1969 to 1988)**

| Land use category | Forest | Land not available for cultivation | Other cultivated land | Current Fallow land | Net Cropped Area | Area in base year (1969) ('000 ha) | Area in Terminal year (1988) ('000 ha) | Percentage change in area |
|---|---|---|---|---|---|---|---|---|
| **Forest** | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 83 | 83 | 0.00 |
| **Land not available for cultivation** | 0.0000 | **0.9250** | 0.0000 | 0.0750 | 0.0000 | 98 | 110 | 13.11 |
| **Other cultivated land** | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 25 | 21 | -17.00 |
| **Current Fallow land** | 0.0000 | 0.0031 | 0.0000 | 0.0000 | **0.9969** | 73 | 168 | 130.05 |
| **Net Cropped Area** | 0.0000 | 0.0053 | 0.0000 | 0.0941 | **0.9005** | 1433 | 1329 | -7.23 |

Note: Land not available for cultivation includes i) Barren and uncultivable land ii) Land put to non-agricultural uses.

Other cultivated land excluding fallow land includes i) Cultivable waste. ii) Permanent pastures and other grazing land.

Fallow land includes i) Other fallow lands and ii) Current fallow land.

Source of data for Markov chain analysis: district level data for 1969 to 1988 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Table 4.12: Transitional probabilities of Land use in MVRANK Bijapur district in Northern Dry Zone of Karnataka during Post Green Revolution Period (1989 to 2007)**

| Land use category | Forest | Land not available for cultivation | Other cultivated land | Current Fallow land | Net Cropped Area | Area in base year (1989) (‘000 ha) | Area in Terminal year (2007) (‘000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Forest** | 0.9849 | 0.0151 | 0.0000 | 0.0000 | 0.0000 | 83 | 83 | 0.13 |
| **Land not available for cultivation** | 0.0008 | 0.9863 | 0.0129 | 0.0000 | 0.0000 | 111.2 | 120 | 8.02 |
| **Other cultivated land** | 0.0008 | 0.0061 | 0.0126 | 0.0000 | 0.9805 | 20 | 21 | 2.75 |
| **Current Fallow land** | 0.0008 | 0.0013 | 0.0126 | 0.5076 | 0.4777 | 120 | 141 | 17.57 |
| **Net Cropped Area** | 0.0008 | 0.0000 | 0.0126 | 0.0663 | 0.9204 | 1377 | 1347 | -2.20 |

Note: Land not available for cultivation includes i) Barren and uncultivable land ii) Land put to non-agricultural uses.

Other cultivated land excluding fallow land includes i) Cultivable waste. ii) Permanent pastures and other grazing land.

Fallow land includes: i) other fallow lands and ii) current fallow land.

Source of data for Markov chain analysis: district level data for 1989 to 2007 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

**Table 4.13: Transitional probabilities of Land use in Tumkur MVRASK District in Eastern Dry Zone of Karnataka during Green Revolution Period (1969 to 1988)**

| Land use category | Forest | Land not available for cultivation | Other cultivated land | Current Fallow land | Net Cropped Area | Area in base year (1969) ('000 ha) | Area in Terminal year (1988) ('000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Forest** | 0.0355 | 0.0000 | 0.9645 | 0.0000 | 0.0000 | 46 | 45 | -1.96 |
| **Land not available for cultivation** | 0.0000 | 0.2997 | 0.0000 | 0.0000 | 0.7003 | 142 | 168 | 18.17 |
| **Other cultivated land** | 0.0385 | 0.0000 | 0.7331 | 0.2283 | 0.0000 | 220 | 173 | -21.53 |
| **Current Fallow land** | 0.0547 | 0.1772 | 0.0115 | 0.1304 | 0.6262 | 192 | 104 | -45.91 |
| **Net Cropped Area** | 0.0543 | 0.1740 | 0.0073 | 0.1699 | 0.5946 | 464 | 575 | 23.83 |

Note: Land not available for cultivation included i) Barren and uncultivable land ii) Land put to non-agricultural uses.

Other cultivated land excluding fallow land included i) Cultivable waste. ii) Permanent pastures and other grazing land.

Fallow land included i) other fallow lands and ii) current fallow land.

Source of data for Markov chain analysis: district level data for 1969 to 1988 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Table 4.14: Transitional probabilities of Land use in MVRASK Tumkur District in Eastern Dry Zone during Post Green Revolution Period (1989 to 2007)**

| Land use category | Forest | Land not available for cultivation | Other cultivated land | Current Fallow land | Net Cropped Area | Area in base year (1989) ('000 ha) | Area in Terminal year (2007) ('000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Forest** | 0.9653 | 0.0347 | 0.0000 | 0.0000 | 0.0000 | 45 | 45 | 0.40 |
| **Land not available for cultivation** | 0.0000 | 0.9689 | 0.0000 | 0.0000 | 0.0311 | 169 | 173 | 2.45 |
| **Other cultivated land** | 0.0016 | 0.0000 | 0.6253 | 0.0000 | 0.3731 | 171 | 139 | -18.66 |
| **Current Fallow land** | 0.0019 | 0.0034 | 0.0463 | 0.0000 | 0.9485 | 91 | 99 | 9.31 |
| **Net Cropped Area** | 0.0019 | 0.0062 | 0.0844 | 0.1958 | 0.7118 | 589 | 608 | 3.21 |

Note: Land not available for cultivation included i) Barren and uncultivable land ii) Land put to non-agricultural uses.

Other cultivated land excluding fallow land included i) Cultivable waste. ii) Permanent pastures and other grazing land.

Fallow land included i) other fallow lands and ii) current fallow land.

Source of data for Markov chain analysis: district level data for 1989 to 2007 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Cropping pattern dynamics in MVRANK Bijapur**

During the green revolution period, the probability of transition of cereals and millets, pulses and oilseeds to their respective states was 0.88 to 0.89 (Table 4.15). The transition of vegetables to pulses and oilseeds was 0.47. The transition from fruit crops to pulses was the highest (1.00). And that from sugarcane and cotton to cereals and millets was 0.39.

In post green revolution period the probability of retention of cereals and millets, pulses and oilseeds has been lower as compared to green revolution period. The probability of transition from sugarcane and cotton to cereals and millets has been (0.66), while that from vegetables to sugarcane and cotton has been 0.77 (Table 4.16). Thus, diversification holds the key for development in the post green revolution period while specialization held the key during the green revolution period.

**Cropping pattern dynamics in MVRASK Tumkur**

In the green revolution period, the probability of retention of cereals and millets, pulses and oilseeds in their respective states has been 0.93 to 0.92 (Table 4.17). The probability of transition from sugarcane and cotton to cereals and millets was the highest (1.00) followed by vegetables to cereals and millets (0.88). The probability of transition from perennial crops to pulses and oilseeds was 0.53, while that of retention in perennial crops is 0.26.

In post green revolution period, the probability of retention in cereals and millets, pulses and oilseeds in their original state has reduced to 0.64 to 0.60. The probability of transition from vegetables to perennials was the highest (1.00) (Table 4.18) and that from perennial to cereals and millets 0.54 were impressive.

**Table 4.15: Transitional probabilities of cropping pattern in MVRANK Bijapur district in Northern Dry Zone of Karnataka during Green Revolution Period (1969 to 1988)**

| Crops | Cereals and millets | Pulses and oil seeds | Vegetables | Fruit crops | Sugarcane, cotton | Area in base year (1969) ('000 ha) | Area in Terminal year (1988) ('000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals and millets** | 0.8822 | 0.0145 | 0.0000 | 0.0000 | 0.1034 | 927 | 780 | -15.79 |
| **Pulses and oil seeds** | 0.0648 | 0.8919 | 0.0366 | 0.0066 | 0.0000 | 216 | 352 | 63.03 |
| **Vegetables** | 0.0000 | 0.4736 | 0.4616 | 0.0648 | 0.0000 | 10 | 26 | 173.99 |
| **Fruit crops** | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 1 | 5 | 262.77 |
| **Sugarcane, cotton** | 0.3948 | 0.0498 | 0.0000 | 0.0000 | 0.5554 | 198 | 94 | -52.62 |

Note: Cereals and millets crops included area under Paddy, Wheat, Sorghum, Maize, Pearl millet, Finger millet.

Pulses and oil seed crops included Chickpea, Pigeonpea, Groundnut, Sunflower, Safflower, Sesamum, Rape seed and mustered.

Vegetables crops included Potato, Tomato, Onion, Brinjal etc.

Fruit crops included Grape, Lemon, Ber, and Pomegranate.

Source of data for Markov chain analysis: district level data for 1969 to 1988 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Table 4.16: Transitional probabilities of cropping pattern in MVRANK Bijapur district in Northern Dry Zone of Karnataka during Post Green Revolution Period (1989 to 2007)**

| Crops | Cereals and millets | Pulses and oil seeds | Vegetables | Fruit crops | Sugarcane, cotton | Area in base year (1989) ('000 ha) | Area in Terminal year (2007) ('000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals and millets** | 0.7774 | 0.1622 | 0.0182 | 0.0000 | 0.0422 | 830 | 746 | -10.12 |
| **Pulses and oil seeds** | 0.1968 | 0.7860 | 0.0173 | 0.0000 | 0.0000 | 423 | 592 | 39.95 |
| **Vegetables** | 0.0000 | 0.0000 | 0.1918 | 0.0412 | 0.7670 | 22 | 66 | 200.00 |
| **Fruit crops** | 0.0000 | 0.1955 | 0.0000 | 0.8045 | 0.0000 | 5 | 24 | 380.00 |
| **Sugarcane, cotton** | 0.6592 | 0.0000 | 0.0000 | 0.0346 | 0.3062 | 66 | 120 | 81.82 |

Note: Cereals and millets crops included area under Paddy, Wheat, Sorghum, Maize, Pearl millet, Finger millet.

Pulses and oil seed crops included Chickpea, Pigeonpea, Groundnut, Sunflower, Safflower, Sesamum, Rape seed and mustered.

Vegetables crops included Potato, Tomato, Onion, Brinjal etc.

Fruit crops included Grape, Lemon, Ber, and Pomegranate.

Source of data for Markov chain analysis: district level data for 1989 to 2007 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Table 4.17: Transitional probabilities of cropping pattern in MVRASK Tumkur district in Eastern Dry Zone of Karnataka during Green Revolution Period (1969 to 1988)**

| Crops | Cereals and millets | Pulses and oil seeds | Vegetables | Arecanut and Coconut | Sugarcane, cotton | Area in base year (1969) (‘000 ha) | Area in Terminal year (1988) (‘000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals and millets** | 0.9356 | 0.0369 | 0.0026 | 0.0081 | 0.0168 | 236.40 | 274.80 | 16.24 |
| **Pulses and oil seeds** | 0.0595 | 0.9269 | 0.0036 | 0.0100 | 0.0000 | 46.20 | 175.10 | 279.00 |
| **Vegetables** | 0.8770 | 0.0000 | 0.0000 | 0.1230 | 0.0000 | 1.82 | 1.65 | -9.34 |
| **Arecanut and Coconut** | 0.1492 | 0.5338 | 0.0523 | 0.2647 | 0.0000 | 3.33 | 5.47 | 64.26 |
| **Sugarcane, cotton** | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 4.20 | 2.90 | -30.95 |

Note: Cereals and millets crops included area under Paddy, Wheat, Sorghum, Maize, Pearl millet, Finger millet.

Pulses and oil seed crops included Chickpea, Pigeonpea, Groundnut, Sunflower, Safflower, Sesamum, Rape seed and mustered.

Vegetables crops included Potato, Tomato, Onion, Brinjal etc.

Source of data for Markov chain analysis: district level data for 1969 to 1988 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

**Table 4.18: Transitional probabilities of cropping pattern in MVRASK Tumkur district in Eastern Dry Zone of Karnataka during Post Green Revolution Period (1989 to 2007)**

| Crops | Cereals and millets | Pulses and oil seeds | Vegetables | Arecanut and Coconut | Sugarcane, cotton | Area in base year (1989) ('000 ha) | Area in Terminal year (2007) ('000 ha) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals and millets** | 0.6444 | 0.3286 | 0.0051 | 0.0215 | 0.0005 | 240.8 | 250.54 | 4.04 |
| **Pulses and oil seeds** | 0.3922 | 0.5992 | 0.0000 | 0.0000 | 0.0085 | 187.8 | 190.03 | 1.19 |
| **Vegetables** | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 0.0000 | 1.53 | 2.67 | 74.64 |
| **Arecanut and Coconut** | 0.5364 | 0.0000 | 0.0563 | 0.4073 | 0.0000 | 5.78 | 18.09 | 213.03 |
| **Sugarcane, cotton** | 0.5422 | 0.0000 | 0.0000 | 0.0000 | 0.4578 | 2.1 | 3.43 | 63.29 |

Note: Cereals and millets crops included area under Paddy, Wheat, Sorghum, Maize, Pearl millet, Finger millet.

Pulses and oil seed crops included Chickpea, Pigeonpea, Groundnut, Sunflower, Safflower, Sesamum, Rape seed and mustered.

Vegetables crops included Potato, Tomato, Onion, Brinjal etc.

Source of data for Markov chain analysis: district level data for 1989 to 2007 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

## 4.6 Transitional probabilities of cropping pattern in of sample farmers in the study area using Markov chain analysis (micro data)

### Crop pattern dynamics in GBFS Kappanimbargi

In Kappanimbargi, there has been reduction in area under vegetables to the tune of 40 per cent, that under pulses and oilseeds to the tune of 36 percent. The transitional probability matrix indicated that the probability of shift from the state of pulses and oilseeds to cereals is 0.98 (Table 4.19).

### Crop pattern dynamics in DFSCFCC Markabbinahalli

In Markabbinahalli, the perceptible change in the crop pattern is that of cotton, where the area increased by 311 percent. The transitional probability of the state of cotton retaining in the same state is accordingly 0.93. Similarly the probability of moving from the state of onion to cotton is 1.0. Comparing the area in sunflower and safflower between 2009 and 2011, there is a reduction by 83 percent. This is reflected in the transitional probability of the shift in the state of sunflower and safflower to pigeon pea and chick pea being 0.61, with the probability of retention in the same state being (0.39) (Table 4.20). Else, there has been no major change in the crop pattern. The probability of the state of moving from sorghum, pearl millet and wheat to pigeon pea is 1, while that of moving from the state of pigeon pea to sorghum is 0.53.

### Cropping Pattern dynamics in FBFSGM Tharati

The area under sweet flag which was around 21 acres in 1998 (Table 4.21), reduced to 0.5 acre in 2011, a reduction of 98 percent. Similarly, the area under paddy which was around 39 acres in 1998, reduced to 20 acres in 2011, a reduction of around 50 percent. Even the

**Table 4.19: Transitional probabilities of cropping pattern in GBFS Kappanimbargi village in MVRANK Bijapur district of Karnataka (2009 to 2011)**

| Crops | Cereals & Millets | Pulses & Oil seeds | Sugarcane & cotton | Vegetables | Fruit crops | Area in base year (2009) (Acre) | Area in Terminal year (2011) (Acre) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals & Millets** | **0.0000** | 0.8530 | 0.1470 | 0.0000 | 0.0000 | 177.98 | 150.45 | -15.47 |
| **Pulses & Oil seeds** | 0.9841 | **0.0000** | 0.0000 | 0.0159 | 0.0000 | 98.52 | 63.15 | -35.90 |
| **Sugarcane, Cotton** | 0.2214 | 0.0000 | **0.0000** | 0.0000 | 0.7786 | 13 | 12.25 | -5.77 |
| **Vegetables** | 0.0000 | 0.8595 | 0.0000 | **0.1405** | 0.0000 | 6 | 3.63 | -39.58 |
| **Fruit crops** | 0.3819 | 0.0000 | 0.0000 | 0.0579 | **0.5602** | 28.38 | 27.75 | -2.20 |

Note: Cereals and Millet crops includes Maize, Wheat, Sorghum and Pearl millet.

Pulses and Oil seed crops includes Green gram, Groundnut, Horsegram, Pigeonpea, Sunflower and Chickpea.

Vegetable crops includes Menthi, Chilli, Cucumber, Ladys finger, leafy vegetables and Onion.

Fruit crops includes Ber, Grapes, Lemon and Pomegranate.

Source of data for Markov chain analysis: village level data for 2009 to 2011 obtained from ICRISAT’s VDSA macro level data. Patancheru, Hyderabad.

**Table 4.20: Transitional probabilities of cropping pattern in DFSCFCC Markabbinahalli village in MVRANK Bijapur district of Karnataka (2009 to 2011)**

| Crops | Sorghum, pearl millet & Wheat | Sunflower & Safflower | Pigeonpea& Chickpea | Cotton | Onion | Area in base year (2009) (Acre) | Area in Terminal year (2011) (Acre) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Sorghum, pearl millet & Wheat** | **0.0000** | 0.0000 | 1.0000 | 0.0000 | 0.0000 | 95.43 | 86.28 | -9.59 |
| **Sunflower & Safflower** | 0.0000 | **0.3867** | 0.6133 | 0.0000 | 0.0000 | 47.86 | 8.25 | -82.76 |
| **Pigeonpea& Chickpea** | 0.5300 | 0.0000 | **0.2704** | 0.1461 | 0.0535 | 139.71 | 133.71 | -4.29 |
| **Cotton** | 0.0000 | 0.0000 | 0.0000 | **0.9330** | 0.0670 | 11.25 | 46.25 | 311.11 |
| **Onion** | 0.0000 | 0.0000 | 0.0000 | 1.0000 | **0.0000** | 1.5 | 9.75 | 550.00 |

Source of data for Markov chain analysis: village level data for 1989 to 2007 obtained from ICRISAT's VDSA macro level data. Patancheru, Hyderabad.

**Table 4.21. Cropping pattern profile of Sweet flag farms in FBFSGM Tharati village (1998)**

| Sl. No. | Crops (Irrigated) | Season | Area (in acre) | Percentage of area |
|---|---|---|---|---|
| 1. | Paddy | Kharif | 5.75 | 15.49 |
| 2. | Vegetables | Kharif | 2.5 | 6.73 |
| 3. | Sweet flag | Annual | 20.95 | 56.42 |
| 4. | Arecanut | Perennial | 4.18 | 11.26 |
| 5. | Coconut | Perennial | 1.25 | 3.37 |
| 6. | Mulberry | Perennial | 2.5 | 6.73 |
| | **Total** | | **37.13** | **100.00** |
| | Rainfed Crops | | | |
| 7. | Ragi | Kharif | 32.8 | 76.19 |
| 8. | Groundnut | Kharif | 10.25 | 23.81 |
| | **Total** | | 43.05 | 100.00 |

Source: Lokesh, 1998.

area under groundnut crop was reduced by 90 percent. However, the area under chrysanthemum and china aster, which was virtually nonexistent in 1998, is around 11 acres in 2011.

Considering the transitional probabilities which are given in Table 4.22, the probability of the area under sweet flag shifting to flower crops is 0.90. Thus, the probability of staying in the present state of sweet flag is zero, while the probability of moving to the state of flower crops is 0.90. Similarly, the probability of paddy and ragi staying in the state of paddy and ragi is 0.75, while that of moving to perennial crops is 0.25. The probability of moving from the state of groundnut crop to that of paddy and ragi is 0.76, while that of moving to flower crops is 0.15. Thus, diversification holds the key for development in the post green revolution period while specialization held the key during the green revolution period.

**Crop pattern dynamics in GBFSD Belladamadagu**

In Belladamadagu, there had been uniformity in crop pattern between 2009 and 2011. Except for the area under cereals, millets increased by 25 per cent (Table 4.23). There is no perceptible change in crop pattern akin to Tharati. As this village is dominant in food crops, the transitional probability matrix has predicted the probability of shift in the state of cereals and millets to pulses and oilseeds as 1.00. Similarly, shift in the state of pulses and an oil seed to cereals and millets is 0.36.

## 4.7 Sources of information, supply of new technology inputs and the markets for different crops

The sources of information of new agricultural technology by sample farmers in VDSA villages of Karnataka have been given in Table 4.24. In Kappanimbargi, the sample farmers were accessing agricultural

**Table 4.22: Transitional probabilities of cropping pattern in PCF Tharati village in MVRASK Tumkur district of Karnataka (1998 to 2011)**

| Crops | Paddy &Ragi | Groundnut | Chrysanthemum & China aster | Sweet flag | Perennial crops | Area in base year (1998) (Acre) | Area in Terminal year (2011) (Acre) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Paddy &Ragi** | 0.7471 | 0.0000 | 0.0000 | 0.0000 | 0.2529 | 38.55 | 19.93 | -48.31 |
| **Groundnut** | 0.7629 | 0.0000 | 0.1477 | 0.0894 | 0.0000 | 10.25 | 1.1 | -89.27 |
| **Chrysanthemum & China aster** | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.00 | 11.13 | - |
| **Sweet flag** | 0.0000 | 0.0964 | 0.9036 | 0.0000 | 0.0000 | 20.95 | 0.5 | -97.61 |
| **Perennial crops** | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 1.0000 | 7.93 | 9.61 | 21.19 |

**Note:** Perennial crop includes Arecanut, Coconut, Jasmine, Beetlevine, Mulberry and Banana.

Sources of data for Markov chain analysis: village level data for 2011 from VDSA, ICRISAT and for 1998 the data are obtained from Lokesh thesis.

**Table 4.23: Transitional probabilities of cropping pattern in GBFSD Belladamadugu village in MVRASK Tumkur district of Karnataka (2009 to 2011)**

| Crops | Cereals & Millets | Pulses & Oil seeds | Chrysanthemum & Marigold | Cotton | Arecanut & Coconut | Area in base year (2009) (Acre) | Area in Terminal year (2011) (Acre) | Percentage change |
|---|---|---|---|---|---|---|---|---|
| **Cereals & Millets** | **0.0000** | 1.0000 | 0.0000 | 0.0000 | 0.0000 | 27.8 | 34.70 | 24.83 |
| **Pulses & Oil seeds** | 0.3653 | **0.5596** | 0.0376 | 0.0134 | 0.0242 | 82.65 | 80.48 | -2.62 |
| **Chrysanthemum & Marigold** | 1.0000 | 0.0000 | **0.0000** | 0.0000 | 0.0000 | 0 | 3.5 | - |
| **Cotton** | 1.0000 | 0.0000 | 0.0000 | **0.0000** | 0.0000 | 0 | 1.25 | - |
| **Arecanut& Coconut** | 0.0000 | 1.0000 | 0.0000 | 0.0000 | **0.0000** | 2 | 2.25 | 12.50 |

**Note:** Cereals and Millet crops includes Sorghum, Paddy, Finger millet and Maize.

Pulses and Oil seed crops includes D.lab lab, Caster, Cowpea, Groundnut, Horsegram, Pigeonpea and Green gram.

Sources of data for Markov chain analysis: village level data for 2009 to 2011 have been obtained from VDSA, ICRISAT, Patancheru, Hyderabad.

**Table 4.24: Sources of information of new agricultural technology in VDSA villages of Karnataka, 2012-13 (proportion of sample farmers)**

| Source | FBFSGM Tharati (n=30) | GBFSD Belladamadugu (n=30) | GBFS Kappanimbargi (n=30) | DFSCFCC Markabbinahalli (n=30) |
|---|---|---|---|---|
| Mobile phone* | 3 | 0 | 0 | 0 |
| State RaithaSamparka Kendra | 7 | 17 | 0 | 10 |
| Word of Mouth | 33 | 40 | 40 | 50 |
| Progressive Farmer | 33 | 30 | 33 | 30 |
| Input Dealer | 23 | 13 | 27 | 10 |
| **Total** | **100** | **100** | **100** | **100** |

***:** In Kappanimbargi and Markabbianahalli the tower is located between 3-4km from village. In Tharati and Belladamadugu the tower is located between 8-10 km from village.

Source: Primary data.

information from word of mouth (40 %) followed by progressive farmers (33 %) and input dealer (27 %) respectively. In DFSCFCC Markabbinahalli, around 50 per cent of sample farmers were accessing agricultural information through word of mouth followed by progressive farmers (30 %), *Raitha Samparka Kendras* (10 %) and input dealer (10 %) respectively. In FBFSGM Tharati, sample farmers were accessing agricultural information through word of mouth of progressive farmers (33 per cent) followed by input dealer (23 per cent), *Raitha Samparka Kendras* (7 per cent) and mobile phone (3 per cent). In Belladamadugu, most of the sample farmers were accessing agricultural information from word of mouth (40 %) followed by progressive farmers (30 %), *Raitha Samparka Kendras* (17 %) and input dealer (13 %) respectively.

Adoption details of new agricultural technology by sample farmers in (MVRANK) Bijapur district are presented in Tables 4.25 and 4.26. In GBFS Kappanimbargi, around 75 per cent of rainfed farmers were adopting traditional variety of bajra and all farmers with irrigation facility cultivated traditional variety of bajra. About 73 per cent of rainfed farmers adopted improved variety of sorghum. In DFSCFCC Markabbinahalli, almost all rainfed farmers adopted improved variety of different crops like redgram, cotton, sunflower, bengalgram, safflower, sorghum and wheat.

Information regarding adoption of new agricultural technology by sample farmers in MVRASK Tumkur district is in Tables 4.27 and 4.28. In FBFSGM Tharati, all the farmers who were buying irrigation water were cultivating improved variety of ragi followed by farmers with own irrigation facility (80 %) and rainfed farmers (69 %). In the case of paddy, all farmers buying irrigation water and farmers with own irrigation facilities were cultivating improved variety.

**Table 4.25: Access to new agricultural technology in GBFS Kappanimbargi**

| Crops | Rainfed farmers (n=23) | | | Irrigated farmers (n=7) | | |
|---|---|---|---|---|---|---|
| | New technology | Old technology | Total No. of farmers | New technology | Old technology | Total No. of farmers |
| Bajra | 3(25) | 9(75) | 12(100) | 0 | 2(100) | 2(100) |
| Sorghum | 11(73.33) | 4(26.67) | 15(100) | | | |
| Wheat | 1(100) | 0 | 1(100) | | | |
| Pigeonpea | 5(100) | 0 | 5(100) | | | |
| Chickpea | 1(100) | 0 | 1(100) | | | |
| Groundnut | 0 | 5(100) | 5(100) | | | |
| Sugarcane | | | | 1(100) | 0 | 1(100) |
| Ber | | | | 2(100) | 0 | 2(100) |
| Grape | | | | 4(100) | 0 | 4(100) |

Source: Primary data. Note: Figures in parenthesis are the percentages to the total

**Table 4.26: Access to new agricultural technology in DFSCFCC Markabbinahalli**

| Crops | Rainfed farmers (n=30) | | |
|---|---|---|---|
| | New technology | Old technology | Total No. of farmers |
| Sorghum | 10(100) | 0 | 10(100) |
| Wheat | 4(100) | 0 | 4(100) |
| Pigeonpea | 20(100) | 0 | 20(100) |
| Chickpea | 17(100) | 0 | 17(100) |
| Cotton | 17(100) | 0 | 17(100) |
| Sunflower | 1(100) | 0 | 1(100) |
| Safflower | 3(100) | 0 | 3(100) |

Source: Primary data. Note: Figures in parenthesis are the percentages to the total

**Table 4.27: Access to new agricultural technology in FBFSGM Tharati**

| Crops | Rainfed farmers (n=18) | | | Water buyer farmers(n=3) | | | Irrigated farmers (n=9) | | |
|---|---|---|---|---|---|---|---|---|---|
| | New technology | Old technology | Total No. of farmers | New technology | Old technology | Total No. of farmers | New technology | Old technology | Total No. of farmers |
| Ragi | 9(69.23) | 4(30.77) | 13(100) | 3(100) | 0 | 3(100) | 4(80) | 1(20) | 5(100) |
| Paddy | | | | 1(100) | 0 | 1(100) | 5(100) | 0 | 5(100) |
| Maize | 5(100) | 0 | 5(100) | | | | | | |
| Horsegram | 0 | 1(100) | 1(100) | | | | | | |
| Pigeonpea | | | | | | | 1(100) | 0 | 1(100) |
| Groundnut | 2(100) | 0 | 2(100) | | | | 1(100) | 0 | 1(100) |
| Chrysanthemum | | | | 1(100) | | 1(100) | 4(100) | 0 | 4(100) |
| Areca nut | | | | 0 | 1(100) | 1(100) | 0 | 4(100) | 4(100) |

Source: Primary data. Note: Figures in parenthesis are the percentages to the total

**Table 4.28: Access to new agricultural technology in GBFSD Belladamadugu**

| Crops | Rainfed farmers (n=24) | | | Irrigated farmers (n=6) | | |
|---|---|---|---|---|---|---|
| | New technology | Old technology | Total No. of farmers | New technology | Old technology | Total No. of farmers |
| Ragi | 15(100) | 0 | 15(100) | 2(100) | 0 | 2(100) |
| Paddy | | | | 5(100) | 0 | 5(100) |
| Maize | 1(100) | 0 | 1(100) | 1(50) | 1(50) | 2(100) |
| Horsegram | 0 | 1(100) | 1(100) | | | |
| Pigeonpea | 1(100) | 0 | 1(100) | | | |
| Groundnut | 17(89.47) | 2(10.53) | 19(100) | 5(100) | 0 | 5(100) |
| Sorghum fodder | 0 | 1(100) | 1(100) | 0 | 1(100) | 1(100) |
| Maize fodder | | | | 0 | 1(100) | 1(100) |
| Chrysanthemum | | | | 1(100) | 0 | 1(100) |
| Areca nut | | | | 0 | 1(100) | 1(100) |

Source: Primary data. Note: Figures in parenthesis are the percentages to the total

In GBFSD Belladamadugu, all farmers with irrigation facility were adopted improved variety of groundnut followed by rainfed farmers (89 %). In the case of ragi, both rainfed farmers and farmers with irrigation facility adopted improved variety.

**Markets for output sold by sample farmers**

The Markets for crop sold by sample farmers in Bijapur district are given in Tables 4.29 and 4.30. In GBFS Kappanimbargi, around 75 per cent of produced bajra was sold to Horti shandy by rainfed farmers and for the same market 50 per cent of bajra produced was sold by farmers with irrigation facility and the remaining percent of quantity was kept for home consumption. Farmers with irrigation facility and rainfed farmers were selling about 40 per cent sorghum produced to different markets like Bijapur APMC, Indi APMC and Horti shandy. The entire quantity of grapes produced was marketed to Bijapur APMC by the irrigated farmers. In DFSCFCC Markabbinahalli, all the rainfed farmers were selling redgram, cotton and bengalgram to Bijapur APMC and Devarahippargi shandy and sorghum produce to Devarahippargi shandy.

The Markets for crop sold by sample farmers in Tumkur district are given in Tables 4.31 and 4.32. In FBFSGM Tharati, both the farmers buying irrigation water and farmers with irrigation facility were selling chrysanthemum flowers to Tumkur *mandi* and KR market of Bangalore. Only 30 per cent of rainfed farmers were selling ragi to Tumkur APMC and Koratagereshandy and rest of the output was retained for home consumption. The market destiny of farmers buying irrigation water (67 %) and farmer with irrigation facility (40 %) for ragi is Tumkur *mandi* (Table 4.31). In GBFSD Belladamadugu, almost all rainfed farmers and farmers with irrigation facility were selling their groundnut produce to Madhugiri APMC. The farmers with irrigation facility were selling paddy

**Table 4.29: Markets for crops sold in GBFS Kappanimbargi, 2012-13**

| Crops | Rainfed farmers (n=23) | | | Irrigated farmers (n=7) | | | Prices at which sold (Rs./Qtl) | Markets |
|---|---|---|---|---|---|---|---|---|
| | No. of farmers who cultivated | No. of farmers who sold (%) | % of produce sold | No. of farmers who cultivated | No. Of farmers who sold (%) | % of produce sold | | |
| Bajra | 12 | 9(75) | 59 | 2 | 1(50) | 31 | 1600-1700 | Hortishandy |
| Sorghum | 15 | 6(40) | 30 | 7 | 3(43) | 57 | 1700-1800 | Bijapur APMC, Indi APMC, Hortishandy |
| Bengalgram | 1 | 1(100) | 0 | 0 | 0 | 0 | 4400-4500 | Bijapur APMC |
| Pigeonpea | 5 | 3(60) | 64 | 2 | 2(100) | 72 | 3400-3500 | Bijapur APMC, Indi APMC |
| Groundnut | 5 | 4(80) | 62 | 0 | 0 | 0 | 3800-4000 | Bijapur APMC |
| Grape | 0 | 0 | 0 | 4 | 4(100) | 95 | 12000-12500 | Bijapur APMC |
| Ber | 0 | 0 | 0 | 2 | 1(50) | 100 | 2000-2200 | Bijapur APMC |

Source: Primary data.

**Table 4.30: Markets for crops sold in DFSCFCC Markabbinahalli, 2012-13**

| Crops | Rainfed farmers (n=30) | | | Prices at which sold (Rs./Qtl) | Markets |
|---|---|---|---|---|---|
| | No. of farmers who cultivated | No. of farmers who sold (%) | % of produce sold | | |
| Sorghum | 10 | 10(100) | 75 | 1600-1650 | Devarahippargishandy |
| Wheat | 4 | 4(100) | 80 | 2500-2800 | Devarahippargishandy |
| Pigeonpea | 20 | 20(100) | 87 | 3400-3500 | Bijapur APMC, Devarahippargishandy |
| Bengal gram | 17 | 17(100) | 85 | 4000-4100 | Bijapur APMC, Devarahippargishandy |
| Cotton | 17 | 17(100) | 100 | 4500-4600 | Bijapur APMC, Devarahippargishandy |
| Sunflower | 1 | 1(100) | 99 | 3400-3500 | Bijapur APMC |
| Safflower | 3 | 3(100) | 85 | 3900-4000 | Devarahippargishandy |

Source: Primary data.

**Table 4.31: Markets for crops sold in FBFSGM Tharati, 2012-13**

| Crops | Rainfed farmers (n=18) | | | Water buyers (n=3) | | | Irrigated farmers (n=9) | | | | Markets |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. of farmers who cultivated | No. of farmers who sold (%) | % of produce sold | No. of farmers who cultivated | No. of farmers who sold (%) | % of produce sold | No. of farmers who cultivated | No. of farmers who sold (%) | % of produce sold | Prices at which sold (Rs./Qtl) | |
| Ragi | 13 | 4 (31) | 0 | 3 | 2 (67) | 45 | 5 | 2 (40) | 48 | 1650-1800 | Tumkur APMC, Koratagereshandy |
| Paddy | 0 | 0 | 0 | 1 | 1 (100) | 89 | 6 | 6 (100) | 83 | 1200-1250 | Tumkur APMC |
| Maize | 6 | 6 (100) | 97 | 0 | 0 | 0 | 0 | | 0 | 1000-1100 | Tumkur APMC |
| Horsegram | 1 | 1 (100) | 67 | 0 | 0 | 0 | 0 | | 0 | 2300-2400 | Koratagereshandy |
| Pigeonpea | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 (100) | 60 | 3400-3500 | Tumkur APMC |
| Groundnut | 2 | 2(100) | 39 | 0 | 0 | 0 | 2 | 2 (100) | 55 | 3350-3400 | Tumkur APMC, Madhugiri APMC |
| Chrysanthe mum | 0 | 0 | 0 | 1 | 1 (100) | 96 | 6 | 6 (100) | 98 | 7000-7200 | Tumkurmandi, KR market Bangalore |
| Jasmine | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 (100) | 100 | 7000-7200 | TumkurShandy |
| Areca nut | 0 | 0 | 0 | 1 | 1 (100) | 100 | 4 | 4 (100) | 100 | 12000-14000 | Tumkur APMC, Bangalore KR market |

Source: Primary data.

**Table 4.32: Markets for crops sold in GBFSD Belladamadugu, 2012-13**

| Crops | Rainfed farmers (n=24) | | | Irrigated farmers (n=6) | | | Prices at which sold (Rs./Qtl) | Markets |
|---|---|---|---|---|---|---|---|---|
| | No. of farmers who cultivated | No. Of farmers who sold (%) | % of produce sold | No. of farmers who cultivated | No. Of farmers who sold (%) | % of produce sold | | |
| Ragi | 15 | 8(53.33) | 38 | 2 | 1(50.00) | 53 | 1600-1800 | Madhugiri APMC |
| Paddy | 0 | 0 | 0 | 5 | 5(100.00) | 84 | 1300-1400 | Madhugiri APMC |
| Maize | 1 | 1(100.00) | 100 | 2 | 2(100.00) | 100 | 1000-1050 | Madhugiri APMC, Tumkur APMC |
| Horsegram | 1 | 1(100.00) | 80 | 0 | 0 | 0 | 2300-2400 | Madhugiri APMC |
| Pigeonpea | 1 | 1(100.00) | 67 | 0 | 0 | 0 | 3400-3500 | Tumkur APMC |
| Groundnut | 20 | 20(100.00) | 48 | 5 | 5(100.00) | 65 | 3500-3700 | Madhugiri APMC |
| Chrysanthemum | 0 | 0 | 0 | 1 | 1(100.00) | 93 | 7000-7200 | Badavanahalli shandy |

Source: Primary data.

to Madhugiri APMC and around 53 per cent ragi produce was sold in Madhugiri APMC by rainfed farmers.

### 4.8 Marketable surplus

In GBFS Kappanimbargi, the marketable surplus of bajra was 59 per cent for rainfed farmers and 31 per cent for irrigated farmers. In sorghum it was 57 per cent for irrigated farmers and 30 per cent for rainfed farmers. In grapes, the marketable surplus was cent per cent (Table 4.33). Similarly, in DFSCFCC Markabbinahalli, the marketable surplus in cotton crop was 100 per cent, that of sunflower was 99 per cent, redgram (87 %), safflower (85 %), bengalgram (84 %), wheat (80 %) and sorghum (75 %) (Table 4.34).

In FBFSGM Tharati, the marketable surplus of ragi by irrigated farmers was the highest (48 %) followed by farmers buying irrigation water (45 %) and rainfed farmers (20%)(Table 4.35).In the case of rainfed farmers, the marketable surplus was the highest for maize crop (97%). The marketable surplus for chrysanthemum flower was 98 per cent (for irrigated farmers) and 96% for farmers buying irrigation water. In GBFSD Belladamadagu, The marketable surplus was 100 per cent in maize. The marketable surplus for redgram and paddy was 67 per cent and 84 percent respectively (Table 4.36). The marketable surplus of groundnut was 65 per cent for farmers with irrigation facility and 48 per cent for rainfed farmers.

### Costs and return structure of VDSA farmers in the study area

The annual income of VDSA farmers for three periods was shown in Tables 4.37, 4.38 and 4.39. In GBFS Kappanimbargi, the crop net income of small farmers was Rs. 9588 during 2009 and it had decreased to Rs. 7304 in 2011 but it is reverse in the case of large farmers, which was Rs.48435 during 2009 and it had increased to 65083 per hectare

**Table 4.33: Marketable Surplus in GBFS Kappanimbargi, Bijapur district, 2012-13**

| Sl No. | Crops | Rainfed farmers (Qtl) (%) | Farmers with irrigation (Qtl) (%) |
|---|---|---|---|
| 1 | Sorghum | 16.2 (30.22) | 41.4 (57.02) |
| 2 | Bajra | 34 (59.13) | 2 (30.77) |
| 3 | Redgram | 14 (63.64) | 10 (72.41) |
| 4 | Groundnut | 7.85 (62.06) | |
| 5 | Sugarcane | | 215 (97.73) |
| 6 | Ber | | 19 (95) |
| 7 | Grape | | 478 (99.58) |

Note: 16.2 quintal of Sorghum sold formed 30.22 per cent of total output
Source: Primary data.

**Table 4.34: Marketable Surplus in DFSCFCC Markabbinahalli, Bijapur district, 2012-13**

| Sl No. | Crops | Rainfed farmers (Qtl) (%) |
|---|---|---|
| 1 | Sorghum | 152.5(75.12) |
| 2 | Wheat | 46.5(80.17) |
| 3 | Redgram | 327.75(87.11) |
| 4 | Bengalgram | 191.5(84.54) |
| 5 | Cotton | 234.92(100) |
| 6 | Sunflower | 9.9(99) |
| 7 | Safflower | 19.5(84.78) |

Note: 152.5 quintal of Sorghum sold formed 75.12 per cent of total output
Source: Primary data.

**Table 4.35: Marketable Surplus in FBFSGM Tharati, Tumkur district, 2012-13**

| Crops | Rainfed farmers (Qtl) (%) | Farmers with irrigation (Qtl) (%) | Farmers buying irrigation water (Qtl) (%) |
|---|---|---|---|
| Ragi | 8 (20.03) | 12 (47.62) | 8.5 (44.74) |
| Paddy | | 56.90 (83.07) | 16 (88.89) |
| Maize | 28.5 (96.61) | | |
| Horsegram | 0.5 (66.67) | | |
| Pigeonpea | | 1.5 (60) | |
| Groundnut | 0.90 (39.13) | 1.85 (55.22) | |
| Chrysanthemum | | 83.7 (98.12) | 5.3 (96.36) |
| Jasmine | | 5.25 (99.95) | |
| Areca nut | | 11.7 (100) | 2 (100) |

Note: 8 quintal of Ragi sold formed 20 per cent of total output

**Table 4.36: Marketable Surplus in GBFSD Belladamadagu,Tumkur district, 2012-13**

| Crops | Rainfed farmers (Qtl) (%) | Farmers with irrigation (Qtl) (%) |
|---|---|---|
| Ragi | 20.75 (38.25) | 6 (53.33) |
| Paddy | | 59 (83.69) |
| Maize | 14 (100) | 22 (100) |
| Horsegram | 4 (80) | |
| Redgram | 2 (66.67) | |
| Groundnut | 54.8 (47.61) | 20.3 (65.48) |
| Sorghum fodder | 7.8 (43.82) | 75 (20) |
| Maize fodder | | 20 (40) |
| Chrysanthemum | | 42 (93.33) |

Note: 20.75 quintal of Ragi sold formed 28.25 per cent of total output

Source: Primary data.

**Table 4.37: Economics of crops/enterprise in VDSA villages 2009**

(Income in Rs.)

| village | Group of farmers | Crop income (ha) | | | Livestock | | | Non- farm income |
|---|---|---|---|---|---|---|---|---|
| | | Total return | Total cost | Net return | Total return | Total cost | Net return | Net return |
| Kapanimbargi | Labour | 29010 | 10922 | 18088 | 6359 | 6112 | 247 | 121991 |
| | Large | 64850 | 16415 | 48435 | 53556 | 12540 | 41016 | 141968 |
| | Medium | 24148 | 10224 | 13924 | 21764 | 11162 | 10602 | 35597 |
| | Small | 17070 | 7481 | 9588 | 4533 | 2089 | 2444 | 43600 |
| Markabbinahalli | Labour | | | | 1727 | 1867 | -140 | 60229 |
| | Large | 19279 | 9513 | 9765 | 32186 | 20014 | 12172 | 55032 |
| | Medium | 21181 | 10719 | 10461 | 2280 | 2031 | 249 | 19937 |
| | Small | 17874 | 9816 | 8058 | 6350 | 5515 | 835 | 27970 |
| Tharati | Labour | 19274 | 15814 | 3459 | 1325 | 716 | 609 | 124239 |
| | Large | 123035 | 39195 | 83840 | 22495 | 14692 | 7803 | 69623 |
| | Medium | 74928 | 46803 | 28125 | 12749 | 6247 | 6502 | 53672 |
| | Small | 84883 | 45067 | 39817 | 14539 | 7372 | 7167 | 62349 |
| Belladamadugu | Labour | 35736 | 21864 | 13872 | 9924 | 15303 | -5379 | 69736 |
| | Large | 27322 | 21173 | 6150 | 18858 | 15826 | 3032 | 30277 |
| | Medium | 38505 | 24216 | 14289 | 12973 | 10724 | 2249 | 30809 |
| | Small | 68267 | 26557 | 41711 | 25476 | 18545 | 6931 | 54255 |

Source: VDSA data.
Note: 1. livestock includes income from dairy, small ruminants, byproducts of animals, bullocks and others.
2. Non-farm income includes salaried job, caste occupation, business, migration and others.

**Table 4.38: Economics of crops /enterprise in VDSA villages 2010**

(Income in Rs.)

| village | Group of farmers | Crop income (ha) | | | Livestock | | | Non- farm income |
|---|---|---|---|---|---|---|---|---|
| | | Total return | Total cost | Net return | Total return | Total cost | Net return | Net return |
| Kapanimbargi | Labour | 18578 | 8655 | 9923 | 9784 | 10957 | -1173 | 129582 |
| | Large | 99575 | 27306 | 72269 | 84681 | 50791 | 33890 | 64852 |
| | Medium | 33725 | 15183 | 18543 | 47317 | 24989 | 22328 | 48610 |
| | Small | 14673 | 9628 | 5045 | 7827 | 6684 | 1143 | 50663 |
| Markabbinahalli | Labour | | | 0 | 5101 | 3381 | 1720 | 108070 |
| | Large | 27205 | 12860 | 14345 | 38251 | 15863 | 22388 | 76231 |
| | Medium | 39416 | 19365 | 20051 | 4448 | 2056 | 2392 | 72475 |
| | Small | 32005 | 15014 | 16991 | 11549 | 6013 | 5536 | 39623 |
| Tharati | Labour | 50907 | 20599 | 30308 | 3257 | 1263 | 1994 | 136163 |
| | Large | 123660 | 43951 | 79709 | 31351 | 11382 | 19969 | 73085 |
| | Medium | 172450 | 71041 | 101409 | 17202 | 8516 | 8686 | 49024 |
| | Small | 138567 | 51568 | 87000 | 27187 | 9228 | 17959 | 66816 |
| Belladamadugu | Labour | 20583 | 19329 | 1254 | 23015 | 10949 | 12066 | 71398 |
| | Large | 27488 | 21921 | 5567 | 27324 | 25958 | 1366 | 56340 |
| | Medium | 49675 | 28506 | 21170 | 21117 | 19610 | 1507 | 28693 |
| | Small | 37366 | 28427 | 8939 | 38909 | 22286 | 16623 | 45409 |

Source: VDSA data.
Note: 1. livestock includes income from dairy, small ruminants, byproducts of animals, bullocks and others.
2. Non-farm income includes salaried job, caste occupation, business, migration and others.

**Table 4.39: Economics of crops /enterprise in VDSA villages 2011**

(Income in Rs.)

| Village | Group of farmers | Crop income (ha) | | | Livestock | | | Non- farm income |
|---|---|---|---|---|---|---|---|---|
| | | Total return | Total cost | Net return | Total return | Total cost | Net return | Net return |
| Kapanimbargi | Labour | 13926 | 7962 | 5964 | 9219 | 9213 | 6 | 232121 |
| | Large | 96159 | 31076 | 65083 | 95848 | 61040 | 34808 | 185328 |
| | Medium | 31116 | 18353 | 12762 | 27851 | 29125 | -1274 | 117623 |
| | Small | 15894 | 8589 | 7304 | 6643 | 7309 | -666 | 98863 |
| Markabbinahalli | Labour | 20324 | 17983 | 2341 | 6918 | 3381 | 3537 | 147616 |
| | Large | 26900 | 15114 | 11786 | 75710 | 13665 | 62045 | 95881 |
| | Medium | 29290 | 19548 | 9742 | 3402 | 1228 | 2174 | 68996 |
| | Small | 30040 | 24613 | 5427 | 17777 | 5921 | 11856 | 57465 |
| Tharati | Labour | 214851 | 123271 | 91581 | 1522 | 1862 | -340 | 167652 |
| | Large | 105280 | 50768 | 54512 | 33836 | 17090 | 16746 | 119618 |
| | Medium | 145265 | 75519 | 69746 | 19865 | 11162 | 8703 | 68990 |
| | Small | 679338 | 45672 | 633666 | 30402 | 12965 | 17437 | 84708 |
| Belladamadugu | Labour | 59609 | 21573 | 38037 | 31304 | 31287 | 17 | 159907 |
| | Large | 49361 | 33417 | 15944 | 38825 | 49417 | -10592 | 100099 |
| | Medium | 42291 | 31261 | 11031 | 43209 | 46833 | -3624 | 71057 |
| | Small | 41114 | 33936 | 7178 | 53373 | 44851 | 8522 | 99760 |

Source: VDSA data.
Note: 1. livestock includes income from dairy, small ruminants, byproducts of animals, bullocks and others.
2. Non-farm income includes salaried job, caste occupation, business, migration and others.

during 2011. In the case labours, income received from off-farm employment was Rs. 121991 during 2009. In DFSCFCC Markabbinahalli, the off-farm employment income of labours formed Rs.60229 during 2009 and it has increased to Rs. 147616 during 2011. The crop income of medium farmers was Rs.10461, Rs.20051 and Rs.9742 per hectare during 2009, 2010 and 2011 respectively. In FBFSGM Tharati, the contribution of crop net income for large farmers was Rs.83840/hectare during 2009 and it had decreased to Rs.54512/hectare during 2011. In the case of livestock, the large farmers received income of Rs.7803, Rs.19969 and Rs.16746 during 2009, 2010 and 2011 respectively. Whereas in GBFSD Belladamadugu, the small farmers received income from livestock was Rs.6931 during 2009 and it had increased to Rs.8522 during 2011 but it is reverse in the case of crop net income which was Rs.41711/hectare during 2009 and it had decreased to Rs.7178/hectare during 2011.

### 4.9 Costs and return structure of sample farmers in the study area

The annual income of farmers is in Tables 4.40 and 4.41 (on per acre basis). The same results per acre annual income are converted into per farm in Table4.39. In GBFS Kappanimbargi, the off-farm employment income formed Rs.35726 (93 %) of total income followed by livestock Rs.4070 (11 %) and crop income was negative Rs.1608 (4 %) out of the total income of Rs. 38194 for rainfed farmers. For irrigated farmers, the contribution of crop income was Rs.609440 (93 %) followed by off-farm employment Rs.40288 (6 %) and livestock was near to Rs.3232 (1 %) of the total net income of Rs. 652952 per acre (it is due to grape growers). In DFSCFCC Markabbinahalli, rainfed farmers realized a net income of Rs. 100896per farm of which Rs.68269 (68 %) was from off-farm employment followed by crop income Rs.30883 (31 %) and livestock Rs.1744 (2 %). In FBFSGM Tharati, rainfed farmers realized a net income of Rs. 28332 per farm of which Rs.21778 (77 %) was from off-farm

**Table 4.40: Economics of Crops/enterprise in MVRANK Bijapur, 2012-13**

(in Rs./acre)

| Farmers | Average size of farm holding (Acres) | Crops | | | Livestock | | | Non-farm employment | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cost of cultivation | Gross income | Net income | Total cost | Gross income | Net income | Income | Total cost | Gross income | Net income |
| **Kappanimbargi** | | | | | | | | | | | |
| Rainfed farmers | 4.80 | 4566 (78.94) | 4232 (67.20) | -335 (-4.20) | 1217 (21.06) | 2065 (32.80) | 848 (10.66) | 7443 (93.54) | 5784 (100) | 6297 (100) | 7957 (100) |
| Irrigated farmers | 8.00 | 32290 (98.51) | 108470 (99.18) | 76180 (93.34) | 489 (1.49) | 893 (0.82) | 404 (0.49) | 5036 (6.17) | 32779 (100) | 109363 (100) | 81619 (100) |
| **Markabbinahalli** | | | | | | | | | | | |
| Rainfed farmers | 7.39 | 11563 (92.23) | 15569 (92.79) | 4179 (30.61) | 973 (7.76) | 1209 (7.21) | 236 (1.73) | 9238 (67.66) | 12537 (100) | 16779 (100) | 13653 (100) |

Source: Primary data.

Note: Figures in parenthesis are the percentages to the total

**Table 4.41: Economics of Crops/enterprise in MVRASK Tumkur, 2012-13**

(in Rs./acre)

| Farmers | Average size of farm holding (Acres) | Crops | | | Livestock | | | Non-farm employment | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cost of cultivation | Gross income | Net income | Total cost | Gross income | Net income | Income | Total cost | Gross income | Net income |
| **Tharati** | | | | | | | | | | | |
| Rainfed farmers | 0.86 | 7005 (64.30) | 10085 (54.47) | 3080 (9.35) | 3889 (35.70) | 8430 (45.53) | 4541 (13.79) | 25323 (76.87) | 10894 (100) | 18515 (100) | 32944 (100) |
| Water buyers | 2.17 | 12927 (84.87) | 22763 (85.56) | 9836 (52.90) | 2304 (15.13) | 3840 (14.44) | 1536 (8.26) | 7220 (38.83) | 15231 (100) | 26603 (100) | 18592 (100) |
| Irrigated farmers | 1.93 | 32666 (88.11) | 53712 (82.91) | 21046 (43.35) | 4410 (11.89) | 11068 (17.09) | 6658 (13.72) | 20841 (42.93) | 37076 (100) | 64780 (100) | 48544 (100) |
| **Belladamadugu** | | | | | | | | | | | |
| Rainfed farmers | 2.18 | 7741 (69.77) | 12147 (63.60) | 4406 (24.50) | 3354 (30.23) | 6953 (36.40) | 3599 (20.01) | 9977 (55.48) | 11095 (100) | 19100 (100) | 17982 (100) |
| Irrigated farmers | 6.23 | 9047 (76.89) | 11818 (59.83) | 2772 (21.65) | 2718 (23.10) | 7934 (40.17) | 5216 (40.74) | 4815 (37.61) | 11765 (100) | 19752 (100) | 12803 (100) |

Source: Primary data.

Note: Figures in parenthesis are the percentages to the total

**Table 4.42: Economics of Crops/enterprise in MVRANK Bijapur and MVRASK Tumkur, 2012-13**

(in Rs. per farm)

| | **Average size of farm holding (Acres)** | **Crops** | | | **Livestock** | | | **Non-farm employment** | **Total** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Cost of cultivation | Gross income | Net income | Total cost | Gross income | Net income | Income | Total cost | Gross income | Net income |
| **GBFSD Kappanimbargi** | | | | | | | | | | | |
| Rainfed farmers | 4.8 | 21917 | 20314 | -1608 | 5842 | 9912 | 4070 | 35726 | 27763 | 30226 | 38194 |
| Irrigated farmers | 8 | 258320 | 867760 | 609440 | 3912 | 7144 | 3232 | 40288 | 262232 | 874904 | 652952 |
| **DFSCFCC Markabbinahalli** | | | | | | | | | | | |
| Rainfed farmers | 7.39 | 85451 | 115055 | 30883 | 7190 | 8935 | 1744 | 68269 | 92648 | 123997 | 100896 |
| **FBFSGM Tharati** | | | | | | | | | | | |
| Rainfed farmers | 0.86 | 6024 | 8673 | 2649 | 3345 | 7250 | 3905 | 21778 | 9369 | 15923 | 28332 |
| Water buyers | 2.17 | 28052 | 49396 | 21344 | 5000 | 8333 | 3333 | 15667 | 33051 | 57729 | 40345 |
| Irrigated farmers | 1.93 | 63045 | 103664 | 40619 | 8511 | 21361 | 12850 | 40223 | 71557 | 125025 | 93690 |
| **GBFSD Belladamadugu** | | | | | | | | | | | |
| Rainfed farmers | 2.18 | 16875 | 26480 | 9605 | 7312 | 15158 | 7846 | 21750 | 24187 | 41638 | 39201 |
| Irrigated farmers | 6.23 | 56363 | 73626 | 17270 | 16933 | 49429 | 32496 | 29997 | 73296 | 123055 | 79763 |

Source: Primary data.

employment followed by livestock Rs.3905 (14 %) and crop income Rs.2649 (9 %). For farmers buying water for irrigation, the net income was Rs. 40345 per farm of which Rs.21344 (53 %) was from crops followed by off-farm employment Rs.15667 (39 %) and livestock Rs.3333 (9 %). In the case of irrigated farmers, the crop income contributed Rs.40619 (43.35 %), off-farm employment Rs.40223 (42.93 %) and livestock Rs.12850 (13.72 %) of the total net income of Rs. 93690 per farm.

In GBFSD Belladamadagu, for rainfed farmers, the contribution of off-farm employment income was Rs.21750 (55 %) and Rs.29997 (38 %) for irrigated farmers. The contribution of livestock income was Rs.32496 (41 %) for irrigated farmers and Rs.7846 (20%) for rainfed farmers. The contribution of crop income was Rs.9605 (30 %) in rainfed farmers and Rs. 17270 (23 %) for farmers with irrigation facility. Per acre income was less for irrigated farmers as compared to rainfed farmers because the size of holding was more in case of irrigated farmers but actual area cultivated under irrigation was less. The total net income of Rs. 39201 per farm in rainfed farmers and Rs.79763 per farm for irrigated farmers.

### 4.10 Relative economic performance of the most vulnerable rainfed areas in Northern and Southern Karnataka (Rs.)

For farmers cultivating high value crop such as grapes in MVRANK Bijapur, the PCI (per capita income) was Rs. 45636 and farmers cultivating largely food and subsistence crops it was Rs. 28325. This on per acre basis for farmers cultivating grapes was Rs.35227 and Rs. 22271 of gross income for farmers cultivating largely food crops and subsistence crops (Table 4.43).

For farmers cultivating high value crop such as flowers in MVRASK Tumkur district, the per capita income was Rs.36543 and the farmers cultivating largely food and subsistence crops it was Rs.19226. This on per acre basis, farmers cultivating flower crops received Rs.69605 gross income and the farmers cultivating largely food crops and subsistence crops it was Rs. 37390.

### 4.11 Transaction cost and benefits of sample farmers from development programs

In FBFSGM Tharati, among several types of Governmental / developmental programmes in the Tharati village during 2012-13, 33 developmental programmes were in vogue. These programmes have been sub divided into categories such as ration card, educational schemes, pension schemes, Agriculture and Horticulture Department schemes.

**Developmental programs in GBFS Kappanimbargi**

The transaction costs incurred by the respondent farmers to avail benefits from developmental programmes in GBFS Kappanimbargi are indicated in Table 4.44. About 80 per cent of sample farmers were availing benefit from

**Table 4.43: Relative economic performance of the most vulnerable rainfed areas in Northern and Southern Karnataka (Rs.)**

| **Most vulnerable rural area in North Karnataka - Bijapur district** | | | | | |
|---|---|---|---|---|---|
| Sample farmers cultivating grapes | | Other sample farmers | | Percentage increase due to grape cultivation | |
| Per capita Income | Per acre income | Per capita Income | Per acre income | Per capita Income | Per acre income |
| 45636 | 35227 | 28325 | 22271 | 61 | 58 |
| **Most vulnerable rural area in south Karnataka - Tumkur district** | | | | | |
| Sample farmers cultivating Flowers | | Other sample farmers | | Percentage increase due to flower cultivation | |
| Per capita Income | Per acre income | Per capita Income | Per acre income | Per capita Income | Per acre income |
| 36543 | 69605 | 19226 | 37390 | 90 | 86 |

Source: Primary data

**Table 4.44: Transaction cost and benefits of farmers from development programs in GBFS Kappanimbargi, 2012**

| Name of the programme/Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| Ration card | | | | | | | |
| BPL | 24(80) | 121608 | 5067 | 7470 | 311 | 6.14 | Food security for 15 to 20 days / month. Prevents beggary -Builts Self respect |
| APL | 4(13.33) | 10080 | 2520 | 1580 | 395 | 15.6 | Food security for 15 days/ month - Prevents beggary -Builts Self respect |
| Educational schemes | | | | | | | |
| Midday meal scheme (Rs. 5/day/school going student) | 17(56.67) | 48000 | 2824 | 0 | 0 | 0.00 | Nutritious food for children -Reducing malnutrition |
| School uniform (Rs. 250/student) | 16(53.33) | 7500 | 469 | 0 | 0 | 0.00 | School uniform for discipline and identity |
| School books and bag (Rs. 250/student) | 16(53.33) | 7500 | 469 | 0 | 0 | 0.00 | Educational needs and discipline |
| Other Backward | 1(3.33) | 500 | 500 | 0 | 0 | 0.00 | Scholarship for |

| Name of the programme/Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| Community Scholarship | | | | | | | middle school education |
| Kaliyuvamakkalige cycle | 5(16.67) | 1391 | 278 | 0 | 0 | 0.00 | To reduce travel drudgery |
| **Pensionscheme** | | | | | | | |
| Indira Gandhi National Old age pension | 2(6.67) | 14400 | 7200 | 510 | 255 | 3.54 | Old age social security |
| **Agri&Horti dept.** | | | | | | | |
| Suvarnabhumiyojane | 3(10) | 2758 | 919 | 350 | 117 | 12.7 | To encourage farmers to adopt new technology in farming |
| Loan waive | 20(60.67) | 55664 | 2783 | 5901 | 295 | 10.6 | Relief fund for farmers |
| drought prone area program | 1(3.33) | 122 | 122 | 33 | 33 | 27.0 | Relief fund for farmers |
| Yeshswini health insurance program | 1(3.33) | 445 | 445 | 23 | 23 | 5.16 | Health insurance for members of cooperative |

Note: Transaction cost includes information cost (Travel cost), Contractual cost (cost of documents), Enforcement cost (rents paid, cost of follow up). Source: Primary data.

BPL ration card while only 13 per cent are benefiting from APL ration card. In educational schemes, the sample farmers are getting benefit from midday meal scheme (57 per cent) followed by school uniform (53 %), school books and bag (53 %), *kaliyava makkalige cycle* (17 %) and other backward community scholarship (3 %). The impact of educational scheme is in providing nutritious food for children, reducing malnutrition, school uniform for discipline, identity, reduces travel drudgery, scholarship for other backward community student, and educational purposes. In pension scheme only 7 per cent of sample households are availing benefit from Indira Gandhi National Old Age Pension and its impact is to provide old age social security.

In Agriculture Department and Horticulture Department, 61% of farmers availed loan waiver followed by suvarna bhumi yojane (10 %), drought prone area program (3 %) and Yashswini health insurance program was (3 %). The impact was to provide relief fund for farmers, promote farmers to adopt new technology in farming, health insurance for members of any cooperative.

**Developmental programs in DFSCFCC Markabbinahalli**

The transaction costs incurred to avail the benefit from developmental programmes in DFSCFCC Markabbinahalli are indicated in Table 4.45. In ration card program, 93% of households are availing benefit from BPL card while in APL ration card 3 per cent of them are availing benefit. The impact of ration card is to provide food security, prevent beggary for food and build self respect / self esteem. In educational schemes, 53 per cent of the sample farmers are getting benefit from midday meal scheme, school uniform, school books and bag and 17 per cent from *Kaliyuva makkalige cycle*. The impact of educational scheme is to provide nutritious food for children, reducing malnutrition, school uniform for discipline, identity, reduce travel

**Table 4.45: Transaction cost and benefits of farmers from development programs in DFSCFCC Markabbinahalli, 2012**

| Name of the programme/Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| Ration card | | | | | | | |
| BPL | 28(93.33) | 148272 | 5295 | 7290 | 260 | 4.91 | Food security for 15 to 20 days / month. Prevents beggary -Builts Self respect |
| APL | 1(3.33) | 2520 | 2520 | 370 | 370 | 14.68 | Food security for 15 days/ month - Prevents beggary -Builts Self respect |
| Education schemes | | | | | | | |
| Midday meal scheme (Rs. 5/day/school going student) | 16(53.33) | 67500 | 4219 | 0 | 0 | 0.00 | Nutritious food for children -Reducing malnutrition |
| School uniform (Rs. 250/student) | 16(53.33) | 11250 | 703 | 0 | 0 | 0.00 | School uniform for discipline and identity |
| School books and bag (Rs. 250/student) | 16(53.33) | 11250 | 703 | 0 | 0 | 0.00 | Educational needs and discipline |
| Kaliyuva makkalige cycle | 5(16.67) | 1392 | 278 | 0 | 0 | 0.00 | To reduce travel drudgery |

| Name of the programme/Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| **Pensionscheme** | | | | | | | |
| Indira Gandhi National Widow Pension | 6(20) | 28800 | 4800 | 1250 | 208 | 4.34 | Old age social security |
| **Agri&Horti dept.** | | | | | | | |
| Subsidy for seeds | 8(26.67) | 6000 | 750 | 500 | 63 | 8.33 | certified seeds |
| Farm machinary | 4(13.33) | 312 | 78 | 67 | 17 | 21.4 | To save labour and time, also asAdditional income generating activity |
| Drought prone area program | 10(30.33) | 1113 | 111 | 122 | 12 | 10.9 | Relief fund for farmers |
| Yeshswini health insurance program | 4(13.33) | 1614 | 404 | 94 | 24 | 5.82 | Health insurance for members of cooperative |
| Rinderpest vaccination | 1(3.33) | 212 | 212 | 21 | 21 | 9.90 | To control foot and mouth disease |

Note: Transaction cost includes information cost (Travel cost), Contractual cost (cost of documents), Enforcement cost (rents paid, cost of follow up). Source: Primary data.

drudgery and educational purposes. In pension scheme, 20% of sample farmers are availing benefit from Indira Gandhi Widow Pension as old age social security and income social security for widows reducing interdependence.

**Developmental programs in FBFSGM Tharati**

The transaction costs incurred to avail the benefit from developmental programmes in FBFSGM Tharati are indicated in Table 4.46. In ration card program, 73 per cent of the households have BPL card, 13 per cent of them are having APL card and 3 per cent are having Antyodaya card. In pension scheme about 10 per cent and 3 per cent of the households receive Indira Gandhi national widow pension and Indira Gandhi national old age pension scheme respectively. The pension scheme has provided the old age social security and income social security for widows in reducing the interdependence. In educational schemes, 50 per cent, 43 per cent, 43 per cent, 3 per cent and 13 per cent of children are availing benefits from midday meal scheme, school uniform, school books and bag, scholarship for physically challenged student and Kaliyuva makkalige cycle respectively for school going children.

In Agricultural and Horticultural Department, 10 per cent, 27 per cent, 7 per cent, 3 per cent of sample households are availing benefit from Suvarna bhumi yojane, subsidies for gutter sprayer, loan waive, National Horticultural Mission and subsidy for farm machinery respectively. The intention is to encourage farmers to adopt new technology in farming, helps to grow high value crops, relief fund for farmers, to promote high value horticultural crops, to save labour and time, also as, additional income generating activity.

**Table 4.46: Transaction cost and benefits of farmers from development programs in FBFSGM Tharati, 2012**

| Name of the programme/ Scheme | No. of beneficiary households (%)(n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| **Ration card** | | | | | | | |
| Antyodaya | 1(3.33) | 8532 | 8532 | 180 | 180 | 2.11 | Food security for the full month -Prevents beggary -BuiltsSelf respect / Self esteem |
| BPL | 22(73.33) | 112956 | 5134 | 5250 | 239 | 4.65 | Food security for 15 to 20 days / month. Prevents beggary -Builts Self respect |
| APL | 4(13.33) | 13290 | 3323 | 1100 | 275 | 8.27 | Food security for 15 days/ month - Prevents beggary -Builts Self respect |

| **Name of the programme/ Scheme** | **No. of beneficiary households (%)(n=30)** | **Annual benefit or subsidy received** | | **Transaction cost per beneficiary family** | | **Percentage of transaction cost to total benefit** | **Impact** |
|---|---|---|---|---|---|---|---|
| | | **Total benefit for sample households** | **Per household** | **Transaction cost for sample households** | **Per household** | | |
| **Educational schemes** | | | | | | | |
| Midday meal scheme (Rs. 5/day/school going student) | 15(50) | 40500 | 2700 | 0 | 0 | - | Nutritious food for children -Reducing malnutrition |
| School uniform (Rs. 250/student) | 13(43.33) | 12250 | 942 | 0 | 0 | - | School uniform for discipline and identity |
| School books and bag (Rs. 250/student) | 13(43.33) | 12250 | 942 | 0 | 0 | - | Educational needs and discipline |
| Scholarship for physically handicapped student | 1(3.33) | 1000 | 1000 | 50 | 50 | 5.00 | Scholarship for physically handicapped |
| Kaliyuvamakkalige cycle* | 4(13.33) | 1114 | 279 | 0 | 0 | - | To reduce travel drudgery |
| **Pensionscheme** | | | | | | | |
| Indira Gandhi National Widow Pension | 3(10) | 14400 | 4800 | 1500 | 500 | 9.6 | Old age social security |
| Indira Gandhi National Old age pension | 1(3.33) | 4800 | 4800 | 500 | 500 | 10.41 | Old age social security |

| Name of the programme/ Scheme | No. of beneficiary households (%)(n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| **Agri&Horti dept.** | | | | | | | |
| Suvarna bhumi yojane | 3(10) | 3713 | 1238 | 286 | 95 | 7.70 | To encourage farmers to adopt new technology in farming |
| Gutter sprayer | 8(26.67) | 1070 | 134 | 289 | 36 | 27.0 | Helps to grow high value crops |
| Loan waive | 2(6.67) | 2226 | 1113 | 222 | 111 | 9.97 | Relief fund for farmers |
| National Horticulture Mission | 2(6.67) | 3540 | 1770 | 200 | 100 | 5.65 | To promote high value horticulture crops |
| Subsidy for farm machinery | 1(3.33) | 334 | 334 | 134 | 134 | 40.11 | To save labour and time, also as Additional income generating activity |

Note: Transaction cost includes information cost (Travel cost), Contractual cost (cost of documents), Enforcement cost (rents paid, cost of follow up).

Source: Primary data.

**Developmental programs in GBFSD Belladamadugu**

The transaction cost incurred to avail the benefit from developmental programmes in GBFSD Belladamadugu are is indicated in Table 4.47. Amongdifferent types of Governmental / developmental programmes in the Belladamadugu village during 2012-13, around 87 per cent of sample households were benefiting from BPL ration card followed by antyodaya and APL ration card were 7 per cent. Households revealed that the ration card scheme enabled them to get food security, and built self respect/self esteem.

In educational schemes, the highest number of sample households were getting benefit from midday meal scheme (30 per cent) followed by school uniform and school books and bags (27 per cent), *kaliyuva makkalige cycle* (10) per cent and Scheduled caste scholarship (3 per cent). The impact of educational scheme is through providing nutritious food for children, reducing malnutrition, school uniform for discipline, identity, reducing travel drudgery, scholarship for scheduled caste students, and educational purposes. In pension scheme, around 13 per cent of sample households are availing benefit from Indira Gandhi Old Age pension followed by Indira Gandhi National Disability Scheme (3 per cent). The main impact of pension scheme is to provide old age social security and social income security for disabled reducing interdependence.

In Agricultural and Horticultural Department, about 30 per cent of sample households are availing benefit from drought prone area program followed by loan waiver (17 %) and suvarna bhumi yojane (7 %). The intention is to provide relief fund for farmers and encourage farmers to adopt new technology in farming.

**Table 4.47: Transaction cost and benefits of farmers from development programs in GBFSD Belladamadagu, 2012**

| Name of the programme/ Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| **Ration card** | | | | | | | |
| Antyodaya | 2(6.67) | 17064 | 8532 | 350 | 175 | 2.05 | Food security for the full month -Prevents beggary -Builts Self respect / Self esteem |
| BPL | 26(86.67) | 136812 | 5262 | 5190 | 200 | 3.79 | Food security for 15 to 20 days / month. Prevents beggary -Builts Self respect |
| APL | 2(6.67) | 5040 | 2520 | 440 | 220 | 8.73 | Food security for 15 days/ month - Prevents beggary -Builts Self respect |

| Name of the programme/ Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| Educational schemes | | | | | | | |
| Midday meal scheme (Rs. 5/day/school going student) | 9(30) | 28500 | 3167 | | 0 | 0.00 | Nutritious food for children -Reducing malnutrition |
| School uniform (Rs. 250/student) | 8(26.67) | 4500 | 563 | | 0 | 0.00 | School uniform for discipline and identity |
| School books and bag (Rs. 250/student) | 8(26.67) | 4500 | 563 | | 0 | 0.00 | Educational needs and discipline |
| Scheduled Caste Scholarship | 1(3.33) | 250 | 250 | 50 | 50 | 20.00 | Helps for other expenditure |
| Kaliyuvamakkalige cycle | 3(10) | 835 | 278 | | 0 | 0.00 | To reduce travel drudgery |
| **Pensionschemes** | | | | | | | |
| Indira Gandhi National Old age pension | 4(13.33) | 19200 | 4800 | 950 | 238 | 4.95 | Old age social security |
| National disability scheme | 1(3.33) | 12000 | 12000 | 300 | 300 | 2.50 | Income security for disabled and to reduce interdependence |

| Name of the programme/ Scheme | No. of beneficiary households (%) (n=30) | Annual benefit or subsidy received | | Transaction cost per beneficiary family | | Percentage of transaction cost to total benefit | Impact |
|---|---|---|---|---|---|---|---|
| | | Total benefit for sample households | Per household | Transaction cost for sample households | Per household | | |
| **Agri&Horti dept.** | | | | | | | |
| Suvarnabhumiyojane | 2(6.67) | 3183 | 1592 | 382 | 191 | 12.0 | To encourage farmers to adopt new technology in farming |
| Loan waive | 5(16.67) | 13916 | 2783 | 1625 | 325 | 11.6 | Relief fund for farmers |
| Drought prone area program | 10(30.33) | 1113 | 111 | 145 | 15 | 13.02 | Relief fund for farmers |

Note: Transaction cost includes information cost (Travel cost), Contractual cost (cost of documents), Enforcement cost (rents paid, cost of follow up).

Source: Primary data.

**Total benefits accrued to households from developmental programs**

In Agricultural Department, about 30 per cent of sample farmers are availing benefit from drought prone area program followed by subsidy for seeds (27 per cent) and farm machinery (13 per cent). In health program, 13 per cent of yashswini health insurance members were availing benefit from yeshswini card and only 3 per cent of sample farmer households s were getting benefit from rinder pest vaccination to control foot and mouth disease in bovines.

The total benefit availed by sample farmers from development programs GBFS Kappanimbargi and DFSCFCC Markabbinahalli of MVRANK Bijapur district is indicated in Table 4.48. In GBFS Kappanimbargi, 29 developmental programs were listed, while 12 developmental programs benefited the rainfed farmers and 8 developmental programs benefited the farmers with irrigation facility. On an average the benefit received per household by rainfed farmers was Rs. 9425 per year and one time incurring transaction cost of Rs. 539 while in farmers with irrigation facility receives benefit of Rs. 7599 and one time incurring transaction cost of 495. In DFSCFCC Markabbinahalli, on an average rain fed farmers receives benefit of Rs. 9341 from 12 developmental programs out of 32 developmental programs and one time incurring transaction cost of Rs. 324.

The total benefit received by sample farmers from development programs in FBFSGM Tharati and GBFSD Belladamadagu of MVRASK Tumkur district is indicated in Table 4.49. In FBFSGM Tharati, on an average, rain fed farmers received benefit of Rs. 6836 per household per year from 13 developmental programs out of 33 listed developmental programs and one time incurring transaction cost of Rs. 277 per household per year.

**Table 4.48: Types of benefits accrued to farmers from Developmental programs in MVRANK Bijapur district, 2012**

| Location (Area) | GBFS Kappanimbargi village | | | DFSCFCC Markabbinahallii village |
|---|---|---|---|---|
| | Rainfed farmers (n=23) | Irrigated farmers (n=7) | Overall | Rainfed farmers (n=30) |
| Total number of programmes listed by line Departments of the Government | 29 | 29 | 29 | 32 |
| Total number of programmes benefits | 12 | 8 | 12 | 12 |
| Total benefit received by sample farmers per year (Rs.) | 216772 | 53196 | 269968 | 280235 |
| Total transaction cost by sample farmers per year (Rs.) | 12400 | 3467 | 15867 | 9714 |
| Average number of programmes benefiting per household | 3.7 | 3.57 | 3.67 | 3.83 |
| Average benefit received per household per year (Rs.) | 9425 | 7599 | 8999 | 9341 |
| Average transaction cost per household per year (Rs.) | 539 | 495 | 529 | 324 |

Source: Primary data.

**Table 4.49: Total benefits accrued to households from Developmental programs in MVRASK Tumkur district, 2012**

| Location (Area) | FBFSGM Tharati village | | | | GBFSD Belladamadugu village | | |
|---|---|---|---|---|---|---|---|
| | Rainfed farmers (n=18) | Water buyers (n=3) | Irrigated farmers (n=9) | Overall | Rainfed farmers (n=24) | Irrigated farmers (n=6) | Overall |
| Total number of programmes listed by line Departments of the Government | 33 | 33 | 33 | 33 | 29 | 29 | 29 |
| Total number of programmes benefits | 13 | 9 | 10 | 15 | 13 | 6 | 13 |
| Total benefit received by sample farmers per year (Rs.) | 123040 | 16619 | 92316 | 231975 | 211736 | 35177 | 246913 |
| Total transaction cost incurredby sample farmers per year (Rs.) | 4977 | 900 | 3834 | 9711 | 7579 | 1853 | 9432 |
| Average number of programmes benefiting per household | 2.8 | 3 | 3.67 | 3.1 | 2.96 | 2.17 | 2.8 |
| Average benefit received per household per year (Rs.) | 6836 | 5540 | 10257 | 7733 | 8822 | 5863 | 8230 |
| Average transaction cost per household per year (Rs.) | 277 | 300 | 426 | 324 | 316 | 309 | 314 |

Source: Primary data.

A farmers buying irrigation water receives an average benefit of Rs. 5540 from 9 development programs and one time incurring transaction cost of Rs. 300. The farmers with irrigation facility receives on an average benefit of Rs. 10257 from 10 Government programs and one time incurring transaction cost of Rs. 426. In GBFSD Belladamadagu, on an average rain fed farmers receives benefit of Rs. 8822 from 13 developmental programs and one time incurring transaction cost of Rs. 316 while in farmers with irrigation receives benefit of Rs. 5863 from 6 developmental programs and one time incurring transaction cost of Rs. 309.

### 4.11 Water markets in FBFSGM Tharati

In FBFSGM Tharati village, there are 40 water buyers and 20 water sellers. Primary data has been collected from a sample of 30 farmers of which 20 sample farmers are water buyers and 10 sample farmers are water sellers. The average size of land holding of water buyers and water sellers are presented in Table 4.50. Around 64 per cent of area is under rainfed and 36 per cent is under irrigation for water buyers, while for water sellers, about 43 per cent of area is rainfed and 60 per cent of area is under irrigation.

### Cropping Pattern of water buyers and water sellers in FBFSGM Tharati

The cropping pattern of sample farmers buying irrigation water and farmers selling irrigation water are presented in Table 4.51. In the case of farmers buying irrigation water, the area under crops cultivated in Kharif season: are Ragi (52 %), chrysanthemum (10 %) and paddy (5 %), in rabi season: chrysanthemum (22 %), in summer: chrysanthemum (3.54 %) and the perennials - Arecanut (4 %) and jasmine (1 %). In the case of farmers selling irrigation water, the area under crops cultivated in Kharif season: chrysanthemum (40 %), ragi (18 %), paddy (14 %) and

**Table 4.50: Average size of holding of water buyers and water sellers for agriculture in FBFSGM Tharati village of Tumkur district, 2012-13**

| Farmers | Rainfed area Acres) | Per cent | Irrigated area (acres) | Per cent |
|---|---|---|---|---|
| Water buyer (n=20) | 0.96 | 64.43 | 0.53 By purchasing water | 35.56 |
| Water seller (n=10) | 0.75 | 43.1 | 0.99 Using own water | 56.9 |

Source: Primary data.

**Table 4.51: Cropping pattern of sample water buyers and water sellers to agriculture in FBFSGM Tharati village of Tumkur district, 2012-13**

| Sl. No. | Crops | Season | Sample Water Buyers (n=20) | | Sample Water Sellers (n=10) | |
|---|---|---|---|---|---|---|
| | | | Area (Acres) | Per cent to total | Area (Acres) | Per cent to total |
| 1 | Ragi | Kharif | 10.96 | 52 | 2.25 | 18.47 |
| 2 | Horse gram | Kharif | 0.5 | 2.36 | 0 | 0 |
| 3 | Paddy | Kharif | 1 | 4.72 | 1.7 | 13.96 |
| 4 | Chrysanthemum | Kharif | 2.07 | 9.76 | 4.87 | 40 |
| 5 | Chrysanthemum | Rabi | 4.73 | 22 | 0.24 | 2 |
| 6 | Chrysanthemum | Summer | 0.75 | 3.54 | 1.9 | 15.60 |
| 7 | Jasmine | Perennial | 0.25 | 1.18 | 0 | 0 |
| 8 | Arecanut | Perennial | 0.95 | 4.48 | 1.23 | 10.06 |
| | **Gross cropped area** | | **21.205** | **100** | **12.19** | **100** |

Source: Primary data.

rabi crop :chrysanthemum (2 %), Similarly, in summer: is chrysanthemum (16 %) and perennial crop is arecanut (10 %).

**The relationship between water buyers and water sellers**

The relationship between water buyers and water sellers of sample farmers are indicated Table 4.52. In the case of farmers buying irrigation water, around 55 per cent were neighbours non relatives followed by neighbour relatives (30 %) and brother (15 %). In the case of farmers selling irrigation water, around 70 per cent of water sellers were selling their irrigation water to neighbour non-relatives and 30 per cent were selling to neighbour relatives.

**The economics of cultivation of chrysanthemum crop by water buyers and water sellers in FBFSGM Tharati**

The economics of cultivation of chrysanthemum crop by water buyers and water sellers are given in Table 4.53.Groundwater seller realized about 48 per cent higher net returns over buyers as they charged for groundwater. The total cost of chrysanthemum was Rs. 45380 per 1/4$^{th}$ acre of water buyers and net income was Rs. 31620 per 1/4$^{th}$ acre. The water seller incurred the total cost for chrysanthemum cultivation is Rs.40617 per 1/4$^{th}$ acre and net income was Rs. 46883 per 1/4$^{th}$ acre.

**Distribution of land ownership and average land holdings by farm size group in VDSA villages in Karnataka**

Table 4.54 reveals that, the average land holding size of large farmers was 9.5 hectares with 42% area under irrigation while in the case of medium farmers the land holding size was 2.8 hectares with 54% area under irrigation and in the case of small farmers and Labour group it was 1.6 hectares and 0.4 hectares with irrigation capacity of 53% and 28% respectively.

**Table 4.52: The relationship between groundwater buyer buy and groundwater seller sell for irrigation in FBFSGM Tharati village, Tumkur district, 2012-13**

| Particulars | Water Buyer (n=20) | Water Seller (n=10) |
|---|---|---|
| Neighbour Relatives | 6 (30) | 3 (30) |
| Neighbour Non relatives | 11 (55) | 7 (70) |
| Brother | 3 (15) | 0 (0) |

**Table 4.53: Economics of cultivation of Chrysanthemum on 1/4th acre (10 guntas) by Groundwater buyers and sellers in Tharati - Ajjihalli, Tumkur district, 2013**

| Items of costs/ returns | Groundwater buyer | | Groundwater seller | | % change over buyer |
|---|---|---|---|---|---|
| | Quantity | Value (Rs) | Quantity | Value(Rs) | |
| 1.Plant material/ seeds | 60 | 2500 | 64 | 2700 | 8 |
| 2.Fertilizers<br>(DAP)(Kgs)<br>20:20:20<br>Urea | <br>50<br>50<br>- | <br>1270<br>1000<br>- | <br>50<br>50<br>25 | <br>1270<br>1000<br>300 | 13.2 |
| 3.FYM (tractor load) | 0.5 | 600 | 1 | 1200 | 100 |
| 4.Water yield of well in Gallons per hour | Not applicable | Not applicable | 2000 | | Not applicable |
| 5.No. of irrigations per week | 2 | - | 2 | | - |
| 6.No. of hours per irrigation | 1.5 | - | 2 | | 25 |
| 7.GW applied in acre inches and its cost per acre inch | 8 | 2775 | 8.4914 | 1600 | 6.1(vol)<br>-42 (value) |
| 8 Total cost of irrigation | 8 X 2775 = | 22,200 | 8.4914X1600= | 13,586 | -39 |
| 9.Labor for cultivation (man days)<br>Woman days | 10<br>14 | 2000<br>1400 | 12<br>17 | 2400<br>1700 | 20(Mdays)<br>21(Wdays) |
| 10.Labor for harvesting + stringing flowers | 1 manday<br>20 woman days | 200<br>2000 | 1<br>24 | 200<br>2400 | -<br>20 |
| 11.Quantity of flowers harvested (in 8 to 10 no. of harvests) | 1100 kgs<br>@ Rs 70/ kg | 77000 | 1250 kgs<br>@ Rs.70 /kg | 87500 | 0 |
| 12.Gross Revenue | - | 77,000 | | 87,500 | 13.6 |
| 13.Transport cost to Tumkur flower market | Distance of 15 kms | 500 | Distance of 15 kms | 500 | 0 |
| 14.Marketing Commission(10 % of gross return) | | 7700 | | 8750 | 13.6 |
| 15.Opportunity cost of working capital @ 5% | | 958.5 | | 1121 | 17 |
| 16.Rental value of land | 10 guntas | 750 | 10 guntas | 800 | 6.7 |
| 17.Risk premium @ 2% of working capital | | 384 | | 448 | 16.7 |
| 18.Management cost @ 10% of working capital | | 1917 | | 2242 | 17 |
| 19.Total Cost | | 45,380 | | 40,617 | -10 |
| 20.Net Income | | 31,620 | | 46,883 | 48 |

**Table: 4.54: Distribution of land ownership and average land holdings by farm size group in Kappanimbargi village**

| Farmers group | Year | Dry land | Irrigated | Total | Average size of holding |
|---|---|---|---|---|---|
| **Large** | 2009 | 54.90(61.27) | 34.70(38.73) | 89.60(100.00) | 8.96 |
| | 2010 | 53.20(59.98) | 35.50(40.02) | 88.70(100.00) | 8.87 |
| | 2011 | 56.10(52.78) | 50.20(47.22) | 106.30(100.00) | 10.63 |
| **Medium** | 2009 | 7.50(36.23) | 13.20(63.77) | 20.70(100.00) | 2.07 |
| | 2010 | 12.10(46.36) | 14.00(53.64) | 26.10(100.00) | 2.61 |
| | 2011 | 20.20(54.01) | 17.20(45.99) | 37.40(100.00) | 3.74 |
| **Small** | 2009 | 4.40(41.51) | 6.20(58.49) | 10.60(100.00) | 1.06 |
| | 2010 | 9.80(50.26) | 9.70(49.74) | 19.50(100.00) | 1.95 |
| | 2011 | 8.60(49.14) | 8.90(50.86) | 17.50(100.00) | 1.75 |
| **Labour** | 2009 | 0.00(0.00) | 0.00(0.00) | 0.00(100.00) | 0.00 |
| | 2010 | 4.00(44.94) | 4.90(55.06) | 8.90(100.00) | 0.89 |
| | 2011 | 1.50(71.43) | 0.60(28.57) | 2.10(100.00) | 0.21 |

Source: VDSA data

Note*:* Figures in parentheses are percentages to the total land holding size

Table 4.55 indicates that, the average land holding size of large farmers was 9.15 hectares while in the case of medium farmers it was 2.25 hectares. In the case of small farmers and Labour, the size of land holding was 1.32 hectares and 0.05 hectares respectively. In the case of labor the land under consideration was leased in land.

Table 4.56 reveals that, the average land holding size of large farmers was 1.1 hectares with 56% area under irrigation while in the case of medium farmers the land holding size was 0.51 hectares with 37% area under irrigation but in the case of small farmers and Labour it was only 0.36 hectares and 0.12 hectares with irrigation capacity of 10 % and 37% respectively. In the case of labor the land under consideration was leased in land.

Table 4.57 reveals that, the average land holding size of large farmers was 2.7 hectares with 20% area under irrigation while in the case of medium farmers the land holding size was 1.26 hectares with 21% area under irrigation and in the case of small farmers and Labour it was 0.76 hectares and 0.56 hectares with irrigation capacity of 34 % and 43% respectively.

**Total asset value per household by farm size in VDSA villages of Karnataka**

In GBFS Kappanimbargi, total value of land owned was highest of Rs.57,04,000 by large group farmers during the year of 2011 as compared to other group farmers like medium, small and labour. In large farmers, the total value of land was almost double Rs.57,04,000 in 2011 as compared to 2009 and 2010. In all farmers group, the land value was almost double in 2011 as compared to 2009 and 2010. In the case of large and medium farmer, total value of livestock was increased to Rs.70190 and Rs.86160 as compared to their previous years like 2009

**Table: 4.55: Distribution of land ownership and average land holdings by farm size group in Markabbinahalli village**

| Farmers group | Year | Dry land | Total | Average size of holding |
|---|---|---|---|---|
| **Large** | 2009 | 102.28 | 102.28 | 10.23 |
| | 2010 | 86.10 | 86.10 | 8.61 |
| | 2011 | 86.10 | 86.10 | 8.61 |
| **Medium** | 2009 | 22.46 | 22.46 | 2.25 |
| | 2010 | 22.46 | 22.46 | 2.25 |
| | 2011 | 22.46 | 22.46 | 2.25 |
| **Small** | 2009 | 8.80 | 8.80 | 0.88 |
| | 2010 | 21.95 | 21.95 | 2.20 |
| | 2011 | 8.80 | 8.80 | 0.88 |
| **Labour** | 2009 | 0.00 | 0.00 | 0.00 |
| | 2010 | 0.00 | 0.00 | 0.00 |
| | 2011 | 1.62 | 1.62 | 0.16 |

Source: VDSA data

Note*:* The hectare for irrigated area was found zero.

**Table 4.56: Distribution of land ownership and average land holdings by farm size group in Tharati village**

| Farmers group | Year | Dry land | Irrigated | Total | Average size of holding |
|---|---|---|---|---|---|
| Large | 2009 | 5.87 (51.45) | 5.54(48.59) | 11.41(100.00) | 1.14 |
| | 2010 | 5.46 (47.85) | 5.95(52.14) | 11.41(100.00) | 1.14 |
| | 2011 | 3.50(33.75) | 6.88(66.34) | 10.37(100.00) | 1.04 |
| Medium | 2009 | 3.24(67.44) | 1.56(32.55) | 4.80(100.00) | 0.48 |
| | 2010 | 3.54(70.82) | 1.46(29.22) | 5.00(100.00) | 0.50 |
| | 2011 | 2.83(50.49) | 2.78(49.48) | 5.61(100.00) | 0.56 |
| Small | 2009 | 2.43(92.32) | 0.20(7.70) | 2.63(100.00) | 0.26 |
| | 2010 | 3.24(94.11) | 0.20(5.88) | 3.44(100.00) | 0.34 |
| | 2011 | 4.05(85.02) | 0.71(14.88) | 4.76(100.00) | 0.48 |
| Labour | 2009 | 0.71(99.76) | 0.00(0.00) | 0.71(100.00) | 0.07 |
| | 2010 | 0.30(19.97) | 1.21(79.88) | 1.52(100.00) | 0.15 |
| | 2011 | 1.11(68.70) | 0.51(32.23) | 1.62(100.00) | 0.16 |

Source: VDSA data

Note*:* Figures in parentheses are percentages to the total land holding size

**Table 4.57: Distribution of land ownership and average land holdings by farm size group in Belladamadagu village**

| Farmers group | Year | Dry land | Irrigated | Total | Average size of holding |
|---|---|---|---|---|---|
| **Large** | 2009 | 21.45(79.40) | 5.56(20.60) | 27.01 | 2.70 |
| | 2010 | 21.50(79.63) | 5.50(20.37) | 27.01 | 2.70 |
| | 2011 | 21.50(79.63) | 5.50(20.37) | 27.01 | 2.70 |
| **Medium** | 2009 | 10.01(76.63) | 3.06(23.37) | 13.07 | 1.30 |
| | 2010 | 10.01(80.36) | 2.49(19.64) | 12.46 | 1.25 |
| | 2011 | 10.01(80.36) | 2.45(19.64) | 12.46 | 1.25 |
| **Small** | 2009 | 4.88(69.91) | 2.10(30.09) | 6.98 | 0.70 |
| | 2010 | 4.45(61.98) | 2.73(38.02) | 7.18 | 0.72 |
| | 2011 | 4.45(66.66) | 2.53(33.33) | 6.98 | 0.70 |
| **Labour** | 2009 | 0.30(15.79) | 1.62(84.21) | 1.92 | 0.19 |
| | 2010 | 5.06(75.86) | 1.61(24.14) | 6.67 | 0.67 |
| | 2011 | 6.67(80.49) | 1.62(19.51) | 8.29 | 0.83 |

Source: VDSA data

Note*:* Figures in parentheses are percentages to the total land holding size

and 2010 while in the case of small and labour group, the value of livestock is decreased to Rs.4600 and Rs.6818 during 2011 as compared to their 2009. Total value of resident house and other assets were shown increasing trend during 2009 to 2011 in all types of farmers group. The total value of stock inventory was shown fluctuation data in different farm size groups. Total value of durable was more in the case of large farmers in all years was given in Table 4.58 of Rs.811826, Rs.898450 and Rs.261670 respectively as compared to rest of the farmers group. Total asset value was highest in the case of large farmers as compared to other farmers group. Farm equipment and average asset value per hectare of farm was highest in the large farmers Rs.444568 and Rs.988252 during 2011 as compared to rest of the farmers group.

In DFSCFCC Markabbinahalli, the value of land owned was highest (Table 4.59) in the case of large farmers of Rs.8435250 as compared to other farmers similarly the value for livestock was also highest of Rs.88020 during 2009. The value for farm equipment was less in the case of small farmers but total asset value and average asset value per hectare of farm was highest in the case of large farmers as compared to other farmers.

In FBFSGM Tharati, the total value of land was more in the case of small farmers of Rs.92575 in 2009 (Table 4.60) and it is almost near to double as compared to previous years like 2009 and 2010 but in rest of the farmers the value of land was not much higher during the period of 2009 to 2011. The total value of livestock was less in the case labour group was Rs.1850 during 2009 and Rs.2700 in 2011 as compared to other farmers group. The total value of resident house, value of stock inventory, value of durables, farm equipment, total asset value and average asset value per hectare of farm were highest in the case of large farmers as compared to other farmers like medium, small and labour groups.

**Table 4.58: Total asset value per household by farm size in Kappanimbargi (Rs.)**

| Particulars | Large | | | Medium | | | Small | | | Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| Total value of land owned | 26,91,325 | 27,62,450 | 57,04,000 | 4,02,000 | 4,99,250 | 9,81,750 | 1,78,500 | 2,55,800 | 3,96,000 | 0 | 40,000 | 70,455 |
| Total value of live Stock | 57,420 | 62,670 | 70,190 | 23,670 | 28,080 | 36,160 | 3,870 | 4,100 | 4,600 | 9,070 | 6,000 | 6,818 |
| Total value of resident house and other assets | 2,27,500 | 2,55,500 | 3,67,500 | 82,000 | 91,500 | 1,07,000 | 65,000 | 91,500 | 1,25,600 | 73,500 | 84,400 | 1,03,182 |
| Total value of stock inventory | 18,082 | 39,404 | 55,997 | 8,955 | 8,065 | 13,156 | 3,702 | 5,452 | 5,342 | 3,347 | 3,966 | 6,258 |
| Total value of durables (Consumer and other durables) | 3,11,826 | 3,93,450 | 2,61,670 | 54,340 | 67,675 | 65,930 | 49,980 | 58,265 | 74,650 | 67,790 | 77,860 | 82,588 |
| Farm equipment | 2,17,160 | 1,57,476 | 4,44,565 | 33,795 | 40,135 | 47,570 | 8,590 | 11,235 | 14,060 | 19,860 | 34,515 | 18,500 |
| Total asset Value | 35,23,313 | 36,70,950 | 69,03,922 | 6,04,760 | 7,34,705 | 12,51,566 | 3,09,642 | 4,26,352 | 6,20,252 | 1,73,567 | 2,46,741 | 2,87,801 |
| Average asset value per hectare of farm | 3,93,684 | 5,28,925 | 9,33,252 | 2,92,734 | 3,07,447 | 3,65,784 | 2,90,935 | 2,37,814 | 3,89,998 | 0 | 2,77,143 | 13,60,759 |

**Table 4.59: Total asset value per household by farm size in Markabbinahalli (Rs.)**

| Particulars | Large | | | Medium | | | Small | | | Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Total value of land owned** | 34,35,250 | 42,54,000 | 74,10,000 | 6,50,750 | 7,80,500 | 16,28,750 | 2,43,750 | 3,39,375 | 6,17,500 | 0 | 0 | 0 |
| **Total value of live Stock** | 33,020 | 32,310 | 28,580 | 2,350 | 4,170 | 1,870 | 7,750 | 8,445 | 9,550 | 1,790 | 2,705 | 8,010 |
| **Total value of resident house and other assets** | 3,49,000 | 3,83,000 | 4,64,000 | 1,03,000 | 1,40,000 | 1,60,000 | 81,500 | 1,12,000 | 1,31,000 | 66,000 | 72,000 | 1,03,400 |
| **Total value of stock inventory** | 24,900 | 47,622 | 47,800 | 5,229 | 7,293 | 14,604 | 3,317 | 5,870 | 12,394 | 1,337 | 4,285 | 5,814 |
| **Total value of durables (Consumer and other durables)** | 1,61,130 | 1,55,810 | 1,67,280 | 34,280 | 57,420 | 1,02,590 | 35,855 | 69,622 | 59,672 | 24,795 | 51,295 | 43,605 |
| **Farm equipment** | 13,635 | 15,990 | 20,035 | 1,190 | 36,000 | 37,730 | 1,045 | 1,085 | 1,365 | 7,487 | 4,190 | 2,910 |
| **Total asset Value** | 40,16,935 | 48,88,732 | 81,37,695 | 7,96,799 | 10,25,383 | 19,45,544 | 3,73,217 | 5,36,397 | 8,31,481 | 1,01,409 | 1,34,475 | 1,63,739 |
| **Average asset value per hectare of farm** | 3,92,724 | 5,67,817 | 12,82,860 | 3,54,764 | 4,56,537 | 8,66,226 | 4,24,014 | 2,44,328 | 6,32,208 | | | 10,11,356 |

Source: VDSA data

**Table 4.60: Total asset value per household by farm size in Tharati (Rs.)**

| Particulars | Large | | | Medium | | | Small | | | Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Total value of land owned** | 400,250 | 400,250 | 460,591 | 130,225 | 126,225 | 163,720 | 55,000 | 55,750 | 92,575 | 5,000 | 5,375 | 16,750 |
| **Total value of live Stock** | 19,500 | 29,720 | 24,832 | 12,450 | 17,060 | 19,615 | 13,560 | 16,580 | 24,450 | 1,350 | 2,000 | 2,700 |
| **Total value of resident house and other assets** | 174,000 | 183,000 | 251,364 | 132,700 | 144,000 | 170,500 | 87,000 | 89,000 | 114,500 | 68,500 | 76,000 | 93,000 |
| **Total value of stock inventory** | 11,425 | 11,688 | 19,055 | 8,478 | 6,609 | 10,668 | 4,291 | 5,109 | 8,475 | 1,905 | 1,804 | 3,950 |
| **Total value of durables (Consumer and other durables)** | 77,910 | 96,070 | 118,305 | 22,840 | 51,420 | 55,465 | 28,985 | 47,620 | 37,782 | 9,745 | 30,685 | 48,645 |
| **Farm equipment** | 28,745 | 30,270 | 81,993 | 6,330 | 6,828 | 11,105 | 1,725 | 3,525 | 6,265 | 1,940 | 1,400 | 2,625 |
| **Total asset Value** | 711,830 | 750,998 | 956,139 | 313,023 | 352,141 | 431,073 | 190,561 | 217,584 | 284,047 | 88,440 | 117,264 | 167,670 |
| **Average asset value per hectare of farm** | 623,755 | 658,078 | 932,545 | 720,255 | 733,627 | 797,251 | 724,567 | 632,511 | 597,364 | 1,249,148 | 772,493 | 1,035,641 |

Source: VDSA data

In Belladamadugu, the value of land was not having much variation between the period of 2009 and 2011 in different group farmers. The value of livestock was less in the case labourers was Rs.6550 during 2009 and Rs. 14800 during 2011 but in rest of the farmers group we could not see the proportion of increase in the value of livestock between 2009 to 2011 periods. Total value of durable was more Rs.74000 in medium and small farmers as compared to large and labour Rs.41000 between the period of 2009 to 2011 (Table 4.61). Total asset value and average asset value per hectare of farm was more in the case of large farmers as compared to rest of the farmers group.

**Average wage rate in VDSA villages in Karnataka**

The data in the Table 4.62 gives the wage rate in the GBFS Kappanimbargi village during the period from 2009 to 2011. The wage rate of non-farm work was higher (Rs. 208.9) as compared to farm work (Rs. 114). The average wage rate was Rs. 215 and Rs.108 for man and woman respectively. In the case of farm work, wage rate of man worker has been increased from Rs. 110 to Rs. 172 whereas woman wage rate from Rs. 54 to Rs. 105 during 2009 to 2011. The wage rate of bullock pair with operator has shown significant increasing trend i.e., from Rs. 492 to 805 during 2009 to 2011 whereas, it was some constancy in the case of tractor with driver for the non-farm work.

Table 4.63 gives the wage rate in the DFSCFCC Markabbinahalli village during the period of 2009 to 2011. The average wage rate of man worker was Rs.198 whereas; it was Rs.92 for woman worker. The average wage rate of non-farm work was higher (Rs.167) as compared to farm work (Rs.137). The wage rate of man worker has been increased from Rs.147 to Rs.200 whereas woman wage rate from Rs.64 to Rs.100 in 2009 and 2011. The wage rate of bullock pair with operator has shown significant increasing trend i.e., from Rs.527 to1000 whereas, it was

**Table 4.61: Total asset value per household by farm size in Belladamadagu (Rs.)**

| Particulars | Large | | | Medium | | | Small | | | Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| Total value of land owned | 360,625 | 366,625 | 516,250 | 137,375 | 109,975 | 190,350 | 111,750 | 121,250 | 166,875 | 0 | 17,500 | 31,000 |
| Total value of live Stock | 20,725 | 23,000 | 24,150 | 12,845 | 13,300 | 24,450 | 19,750 | 22,270 | 21,000 | 6,550 | 9,100 | 14,800 |
| Total value of resident house and other assets | 91,300 | 116,300 | 253,000 | 63,500 | 63,000 | 123,000 | 67,600 | 63,500 | 92,000 | 52,800 | 59,800 | 99,500 |
| Total value of stock inventory | 10,167 | 4,445 | 10,685 | 6,181 | 3,905 | 9,921 | 9,019 | 5,813 | 9,273 | 3,722 | 5,204 | 4,860 |
| Total value of durables (Consumer and other durables) | 40,960 | 24,440 | 70,025 | 31,715 | 36,375 | 61,595 | 43,300 | 38,976 | 80,888 | 21,090 | 29,750 | 60,141 |
| Farm equipment | 55,400 | 54,755 | 9,325 | 5,345 | 4,880 | 4,845 | 4,130 | 6,120 | 5,290 | 523 | 720 | 853 |
| Total asset Value | 579,177 | 589,565 | 883,435 | 256,961 | 231,435 | 414,161 | 255,549 | 257,929 | 375,326 | 84,685 | 122,074 | 211,154 |
| Average asset value per hectare of farm | 214,407 | 218,252 | 327,041 | 196,589 | 185,683 | 332,286 | 414,113 | 404,658 | 608,210 | 440,608 | 182,828 | 254,524 |

Source: VDSA data

**Table 4.62: Average labour wages in Kappanimbargi (Rs.)**

| **Particulars** | **Unit** | **2009** | **2010** | **2011** |
|---|---|---|---|---|
| **A. Farm work** | | | | |
| Male | Day | 110.50 | 148.79 | 172.26 |
| Female | Day | 54.75 | 94.63 | 105.04 |
| Bullock pair with operator | Day | 491.85 | 657.96 | 804.92 |
| Tractor with driver | Hour | 286.08 | 309.00 | 333.83 |
| Harvest cum thresher | Hour | 393.99 | 552.71 | 550.59 |
| **B. Non-farm work** | | | | |
| Male | Day | 204.92 | 316.50 | 336.71 |
| Female | Day | 78.92 | 146.83 | 169.52 |
| Bullock pair with operator | Day | 429.71 | 595.00 | 0.00 |
| Tractor with driver | Hour | 252.27 | 277.18 | 233.68 |

Source: VDSA data

**Table 4.63: Average labour wages in Markabbinahalli (Rs.)**

| Particulars | Unit | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **A. Farm work** | | | | |
| Male | Day | 147.60 | 166.19 | 200.00 |
| Female | Day | 64.89 | 107.24 | 100.00 |
| Bullock pair with operator | Day | 527.34 | 472.22 | 1000.00 |
| Tractor with driver | Hour | 401.04 | 414.09 | 407.89 |
| Harvest cum thresher | Hour | 408.59 | 461.25 | 439.20 |
| **B. Non-farm work** | | | | |
| Male | Day | 217.64 | 258.47 | 200.83 |
| Female | Day | 74.83 | 107.00 | 100.00 |
| Bullock pair with operator | Day | 385.00 | 0.00 | 0.00 |
| Tractor with driver | Hour | 321.55 | 582.92 | 118.23 |

Source: VDSA data

some constancy in the case of Tractor with driver for the farm work. The bullock pair with operator has not been put for the non-farm work from 2010 onwards.

The data in the table 4.64 gives the wage rate in the FBFSGM Tharati village during the period of 2009 to 2011. The wage rate of non-farm work was higher (Rs.167) as compared to farm work (Rs.137). The average wage rate was Rs.211 and Rs.92 for man and woman respectively. In the case of farm work, wage rate of man worker has been increased from Rs.183 to Rs.219 whereas woman wage rate from Rs.55 to Rs.101. The wage rate of bullock pair with operator has shown increasing trend i.e., from Rs.250 to 312 whereas, it was shown some constancy in the case of harvest cum thresher for the farm work.

The details of the wage rate in the Belladamadugu village were presented in the table 4.65. The average wage rate of man worker was Rs.204 whereas; it was Rs.72 for woman worker. The average wage rate of non-farm work was marginally higher (Rs.145) as compared to farm work (Rs.130). The wage rate of bullock pair with operator for the farm work has been increased marginally i.e., from Rs.481 to Rs.563. The bullock pair with operator has not been put for the non-farm work.The wage rate of tractor with driver for the non-farm work has been decreased i.e., from Rs.315 to Rs.100

**Rainfall distribution pattern in VDSA villages of Karnataka**

**Rainfall distribution pattern in Bijapur District:** The Rainfall distribution pattern in the Bijapur district has been given in the Table 4.66. It is clearly evident from the table that rainfall was less during the year 2009 as against 615mm, 376mm and 772mm, 412mm in GBFS Kappanimbargi and DFSCFCC Markabbinahalli village respectively during the 2010 and 2011. The total number of rainy days was higher in

**Table 4.64: Average labour wages in Tharati (Rs.)**

| Particulars | Unit | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **A. Farm work** | | | | |
| Male | Day | 183.33 | 183.19 | 219.10 |
| Female | Day | 55.42 | 85.69 | 101.04 |
| Bullock pair with operator | Day | 250.00 | 255.26 | 312.12 |
| Tractor with driver | Hour | 372.92 | 335.23 | 275.40 |
| Harvest cum thresher | Hour | 560.00 | 598.75 | 595.76 |
| **B. Non-farm work** | | | | |
| Male | Day | 203.69 | 224.00 | 257.64 |
| Female | Day | 91.90 | 95.87 | 127.08 |
| Bullock pair with operator | Day | 0.00 | 0.00 | 0.00 |
| Tractor with driver | Hour | 321.43 | 354.82 | 94.20 |

Source: VDSA data

**Table 4.65: Average labour wages in Belladamadagu (Rs.)**

| Particulars | Unit | 2009 | 2010 | 2011 |
|---|---|---|---|---|
| **A. Farm work** | | | | |
| Male | Day | 222.14 | 155.78 | 210.83 |
| Female | Day | 56.89 | 71.94 | 66.98 |
| Bullock pair with operator | Day | 481.25 | 449.72 | 563.89 |
| Tractor with driver | Hour | 770.83 | 438.51 | 504.17 |
| Harvest cum thresher | Hour | 400.00 | 480.71 | 700.00 |
| **B. Non-farm work** | | | | |
| Male | Day | 199.33 | 184.57 | 254.10 |
| Female | Day | 75.00 | 95.00 | 66.46 |
| Bullock pair with operator | Day | 0.00 | 0.00 | 0.00 |
| Tractor with driver | Hour | 315.42 | 259.70 | 100.00 |

Source: VDSA data

**Table 4.66: Rainfall distribution in Bijapur district (in mm)**

| Particulars | Kappanimbargi | | | Markabbinahalli | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Total Annual Rainfall** | 0.00 | 615.10 | 376.55 | 0.00 | 772.00 | 412.40 |
| **Total rainfall in June to Sept** | 0.00 | 452.50 | 346.85 | 0.00 | 508.80 | 292.40 |
| **Total rainfall in Oct to Jan** | 0.00 | 74.10 | 0.00 | 0.00 | 115.40 | 71.40 |
| **Total rainfall in Feb to May** | 0.00 | 88.50 | 29.70 | 0.00 | 147.80 | 48.60 |
| **Average Monthly Rainfall** | 0.00 | 51.26 | 31.38 | 0.00 | 64.33 | 34.37 |
| **Total no. of rainy days** | 0.00 | 43 | 29 | 0.00 | 59 | 45 |
| **No. of rainy days in rainy season (June to Sept)** | 0.00 | 28 | 24 | 0.00 | 40 | 28 |

Source: VDSA data

DFSCFCC Markabbinahalli village as compared to GBFS Kappanimbargi village during the year 2010 and 2011. Total amount of rainfall received across *Kharif*, *rabi* and *summer* season was higher in the DFSCFCC Markabbinahalli village as compared to GBFS Kappanimbargi village.

**Rainfall distribution pattern in Tumkur District**

The Table 4.67 gives the rainfall distribution pattern in the Tumkur district. The average annual rainfall received during 2010 and 2011 was 643 mm and 579 mm in FBFSGM Tharati and Belladamadugu village respectively. The rainfall received during the year 2010 was higher as against 2011 in both villages which resulted in the higher number of rainy days during 2010 vis a vis 2011.

**Source of information received by the different group of farmers in VDSA villages of Karnataka**

Table 4.68 indicates the source of information received by the different group of farmers in GBFS Kappanimbargi village. The farmers have gathered technical and non-technical information from various sources for carrying out farming activity or agriculture. The major source of information related cattle/poultry rearing and disease were Government department, farmers, mass media and research stations respectively. The major source of information related to Crop varieties/Seed collection were obtained from input dealer, farmers, Government department and mass media respectively while in the case of use of fertilizers and pesticides were obtained from input dealer, farmers, Government department and mass media respectively by all categories of farmers. The farmers obtained major source of information related to horticultural crops from Government department, farmers, mass media and research station and similarly the information related to crop output prices were obtained from input dealers, farmers, Government department and mass media. The information collection

**Table 4.67: Rainfall distribution in Tumkur district (in mm)**

| Particulars | Belladamadugu | | | Tharati | | |
|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| Total Annual Rainfall | 0.00 | 684.73 | 472.20 | 0.00 | 922.90 | 363.00 |
| Total rainfall in June to Sept | 0.00 | 343.90 | 272.80 | 0.00 | 427.20 | 232.70 |
| Total rainfall in Oct to Jan | 0.00 | 165.23 | 29.30 | 0.00 | 318.40 | 139.70 |
| Total rainfall in Feb to May | 0.00 | 175.60 | 170.10 | 0.00 | 177.30 | 363.00 |
| Average Monthly Rainfall | 0.00 | 57.06 | 39.35 | 0.00 | 76.91 | 61.28 |
| Total no. of rainy days | 0.00 | 60 | 47 | 0.00 | 79 | 83 |
| No. of rainy days in rainy season (June to Sept) | 0.00 | 34 | 34 | 0.00 | 47 | 47 |

Source: VDSA data

**Table 4.68: Sources of information in Kappanimbargi**

(n=30)

| Particulars | Input Dealer | | | Seed Company | | | Farmers | | | Non-Government Organization | | | Govt. Department | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** |
| Cattle/Poultry disease | 0.00 | 1.96 | 1.00 | 0.00 | 1.13 | 1.33 | 4.00 | 3.88 | 2.14 | 0.00 | 0.00 | 1.00 | 4.93 | 5.00 | 4.81 |
| Crop output prices | 4.80 | 4.88 | 4.87 | 0.00 | 1.68 | 3.64 | 4.13 | 3.88 | 3.37 | 0.00 | 1.00 | 0.00 | 3.04 | 2.13 | 2.71 |
| Crop varieties | 4.79 | 4.88 | 4.83 | 0.00 | 1.67 | 3.75 | 4.07 | 3.82 | 3.04 | 0.00 | 1.00 | 0.00 | 3.27 | 2.20 | 2.24 |
| Use of Fertilizer | 4.61 | 4.91 | 4.87 | 0.00 | 1.67 | 2.80 | 4.13 | 3.82 | 3.52 | 0.00 | 1.00 | 0.00 | 3.33 | 2.17 | 2.80 |
| Use of pesticides | 4.57 | 4.85 | 4.87 | 0.00 | 1.79 | 2.38 | 3.97 | 3.67 | 3.63 | 0.00 | 1.00 | 0.00 | 3.47 | 2.40 | 2.97 |
| Seed selection | 4.59 | 4.82 | 4.90 | 0.00 | 1.79 | 3.44 | 4.03 | 3.76 | 3.28 | 0.00 | 1.00 | 2.00 | 3.37 | 2.33 | 2.70 |
| Weather information | 0.00 | 2.03 | 1.18 | 0.00 | 1.11 | 1.00 | 3.60 | 3.75 | 2.57 | 0.00 | 0.00 | 0.00 | 3.77 | 3.90 | 3.20 |
| Crop insurance | 0.00 | 2.00 | 1.38 | 0.00 | 1.16 | 1.00 | 4.47 | 3.76 | 2.04 | 0.00 | 0.00 | 0.00 | 4.50 | 5.00 | 5.00 |
| Input subsidies | 0.00 | 2.03 | 1.21 | 0.00 | 1.16 | 1.00 | 4.20 | 3.82 | 2.04 | 0.00 | 0.00 | 1.00 | 4.80 | 5.00 | 5.00 |
| Horticulture crops | 4.00 | 2.07 | 1.57 | 0.00 | 1.15 | 1.33 | 4.13 | 3.78 | 2.11 | 0.00 | 0.00 | 0.00 | 4.76 | 5.00 | 4.57 |
| Cattle/Poultry rearing | 0.00 | 1.92 | 1.27 | 0.00 | 1.17 | 1.11 | 4.10 | 3.88 | 2.07 | 0.00 | 0.00 | 0.00 | 4.90 | 5.00 | 4.89 |
| Others | 0.00 | 2.00 | 1.00 | 0.00 | 1.00 | 0.00 | 4.00 | 4.50 | 3.00 | 0.00 | 0.00 | 0.00 | 5.00 | 4.00 | 5.00 |

| Particulars | Research Station | | | TV, Radio and Media | | | Others | | | Total no. of Households reported | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** | **1** | **2** | **3** |
| Cattle/Poultry disease | 0.00 | 2.00 | 3.94 | 3.07 | 3.00 | 3.06 | 0.00 | 0.00 | 0.00 | 30 | 25 | 16 |
| Crop output prices | 0.00 | 1.00 | 1.87 | 3.25 | 2.73 | 1.85 | 0.00 | 0.00 | 0.00 | 30 | 34 | 31 |
| Crop varieties | 0.00 | 1.00 | 1.48 | 3.00 | 2.76 | 2.27 | 0.00 | 0.00 | 0.00 | 30 | 33 | 30 |
| Use of Fertilizer | 0.00 | 1.00 | 2.07 | 3.50 | 2.76 | 1.56 | 0.00 | 0.00 | 5.00 | 30 | 33 | 30 |
| Use of pesticides | 0.00 | 1.00 | 2.17 | 4.00 | 2.68 | 1.44 | 0.00 | 0.00 | 5.00 | 30 | 33 | 30 |
| Seed selection | 0.00 | 1.00 | 1.90 | 4.50 | 2.68 | 1.63 | 0.00 | 0.00 | 0.00 | 30 | 33 | 30 |
| Weather information | 0.00 | 1.50 | 3.34 | 4.63 | 4.28 | 4.90 | 0.00 | 0.00 | 0.00 | 30 | 40 | 41 |
| Crop insurance | 0.00 | 2.00 | 3.87 | 3.03 | 3.06 | 3.10 | 0.00 | 0.00 | 0.00 | 30 | 33 | 30 |
| Input subsidies | 0.00 | 2.00 | 3.83 | 3.00 | 2.97 | 3.13 | 0.00 | 0.00 | 0.00 | 30 | 33 | 30 |
| Horticulture crops | 0.00 | 2.00 | 3.90 | 3.00 | 2.96 | 2.70 | 5.00 | 0.00 | 5.00 | 30 | 27 | 21 |
| Cattle/Poultry rearing | 0.00 | 2.00 | 4.05 | 3.00 | 3.00 | 3.06 | 0.00 | 0.00 | 0.00 | 30 | 25 | 19 |
| Others | 0.00 | 0.00 | 4.00 | 3.00 | 3.50 | 2.00 | 0.00 | 0.00 | 0.00 | 1 | 2 | 1 |

Source: VDSA data

Note: a) 1=2009; 2=2010; 3=2011.

b) Weighted average formula is (rank1*5 + rank2*4 + rank3*3 + rank….)/no. of response (n)

from Research station was increased during 2011 as compared to 2009 among the farming community.

Table 4.69 indicates the source of information received by the different group of farmers in DFSCFCC Markabbinahalli village. The Farmers have gathered technical and non-technical information from various sources for carrying out farming activity or agriculture. The farmers received major source of information from Government department, farmers and mass media for cattle/poultry rearing and disease as against from input dealer, farmers, Government department and mass media for crop varieties/seed collection. The major source of information related to use of fertilizers and pesticides were obtained from input dealer, farmers, Government department and mass media. The major source of information related to horticultural crops were obtained from government department farmers, mass media and research station respectively and similarly the information related to crop output prices were obtained from input dealers, farmers, Government department and mass media respectively. The information collection from Research station is increasing over the years among the farming community.

Table 4.70 depicts the sources of information; the Farmers have gathered technical and non-technical information from various sources for carrying out farming activity or agriculture. The major source of information related cattle/poultry rearing and disease were Government department, farmers, and mass media where as farmers, input dealer, mass media and government department for crop varieties/seed collection. The major source of information related to use of fertilizers and pesticides were obtained from input dealer, farmers, government department and mass media. The major sources of information related to input subsidies and / or crop insurance were obtained from Government department, farmers, and mass media. The major source of information

**Table 4.69: Sources of information in Markabbinahalli**

(n=30)

| Particulars | Input Dealer | | | Farmers | | | Govt. Department | | | TV, Radio and Media | | | Research Station | | | Others | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Cattle/Poultry disease | 0.00 | 0.00 | 0.00 | 4.00 | 4.00 | 4.06 | 4.93 | 5.00 | 4.94 | 3.07 | 3.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 | 3.00 |
| Crop output prices | 4.80 | 4.93 | 4.53 | 4.13 | 4.03 | 4.23 | 3.04 | 3.04 | 4.00 | 3.25 | 3.00 | 5.00 | 0.00 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 |
| Crop varieties | 4.79 | 4.90 | 4.65 | 4.07 | 4.03 | 3.90 | 3.27 | 3.07 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 0.00 |
| Use of Fertilizer | 4.61 | 5.00 | 4.67 | 4.13 | 4.00 | 3.84 | 3.33 | 3.00 | 4.00 | 3.50 | 0.00 | 3.00 | 0.00 | 0.00 | 4.67 | 0.00 | 0.00 | 0.00 |
| Use of pesticides | 4.57 | 4.97 | 4.55 | 3.97 | 4.00 | 3.81 | 3.47 | 3.03 | 0.00 | 4.00 | 0.00 | 4.00 | 0.00 | 0.00 | 4.67 | 0.00 | 0.00 | 3.00 |
| Seed selection | 4.59 | 5.00 | 0.00 | 4.03 | 4.48 | 4.71 | 3.37 | 4.00 | 4.09 | 4.50 | 3.33 | 0.00 | 0.00 | 5.00 | 4.00 | 0.00 | 3.00 | 3.04 |
| Weather information | 0.00 | 0.00 | 0.00 | 3.60 | 4.35 | 4.13 | 3.77 | 3.19 | 0.00 | 4.63 | 4.55 | 4.89 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 | 3.08 |
| Crop insurance | 0.00 | 0.00 | 0.00 | 4.47 | 3.97 | 4.21 | 4.50 | 4.89 | 4.59 | 3.03 | 3.46 | 3.50 | 0.00 | 0.00 | 3.27 | 0.00 | 3.00 | 3.00 |
| Input subsidies | 0.00 | 0.00 | 0.00 | 4.20 | 3.97 | 3.83 | 4.80 | 4.93 | 4.77 | 3.00 | 3.33 | 4.25 | 0.00 | 0.00 | 3.50 | 0.00 | 3.00 | 3.00 |
| Horticulture crops | 4.00 | 0.00 | 0.00 | 4.13 | 0.00 | 0.00 | 4.76 | 0.00 | 0.00 | 3.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 |
| Cattle/Poultry rearing | 0.00 | 0.00 | 0.00 | 4.10 | 4.00 | 3.59 | 4.90 | 4.97 | 4.68 | 3.00 | 3.06 | 4.00 | 0.00 | 0.00 | 3.00 | 0.00 | 3.00 | 3.00 |
| Others | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Source: VDSA data

Note: a) 1=2009; 2=2010; 3=2011.

b) Weighted average formula is (rank1*5 + rank2*4 + rank3*3 + rank….)/no. of response (n)

**Table 4.70: Sources of information in Tharati**

(n=30)

| Particulars | Input Dealer | | | Farmers | | | Non-Government Organization | | | Govt. Department | | | TV, Radio and Media | | | Research Station | | | Others | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Cattle/Poultry disease | 0.00 | 0.00 | 0.00 | 0.00 | 4.23 | 4.25 | 0.00 | 0.00 | 0.00 | 0.00 | 4.88 | 4.85 | 0.00 | 3.73 | 3.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.50 |
| Crop output prices | 4.00 | 3.94 | 3.67 | 4.33 | 4.57 | 4.94 | 0.00 | 0.00 | 1.50 | 3.40 | 3.11 | 3.03 | 3.57 | 3.29 | 2.25 | 0.00 | 0.00 | 0.00 | 4.47 | 2.67 | 2.32 |
| Crop varieties | 4.32 | 4.21 | 4.31 | 4.47 | 4.43 | 4.50 | 0.00 | 0.00 | 2.00 | 3.27 | 2.93 | 2.79 | 3.30 | 3.13 | 2.19 | 0.00 | 0.00 | 0.00 | 4.00 | 3.00 | 3.00 |
| Use of Fertilizer | 4.41 | 4.15 | 4.00 | 4.30 | 4.14 | 4.50 | 0.00 | 0.00 | 2.00 | 3.38 | 3.41 | 3.27 | 3.30 | 3.71 | 2.47 | 0.00 | 3.00 | 0.00 | 4.00 | 0.00 | 1.67 |
| Use of pesticides | 4.43 | 4.13 | 4.32 | 4.31 | 4.34 | 4.39 | 0.00 | 0.00 | 4.00 | 3.50 | 3.78 | 3.04 | 3.38 | 3.33 | 2.45 | 0.00 | 2.00 | 0.00 | 4.00 | 0.00 | 1.00 |
| Seed selection | 4.36 | 3.95 | 4.38 | 4.48 | 4.55 | 4.38 | 0.00 | 0.00 | 0.00 | 3.70 | 3.80 | 3.22 | 4.00 | 4.57 | 2.50 | 0.00 | 2.00 | 0.00 | 4.00 | 0.00 | 3.50 |
| Weather information | 4.00 | 0.00 | 3.00 | 4.77 | 4.82 | 4.57 | 0.00 | 0.00 | 0.00 | 4.33 | 4.00 | 4.11 | 4.58 | 5.00 | 4.89 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 |
| Crop insurance | 4.00 | 0.00 | 0.00 | 4.40 | 4.74 | 4.00 | 0.00 | 0.00 | 0.00 | 4.57 | 4.67 | 4.55 | 4.44 | 4.95 | 4.93 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Input subsidies | 3.75 | 0.00 | 2.50 | 3.75 | 4.75 | 4.10 | 0.00 | 0.00 | 0.00 | 4.80 | 4.60 | 4.59 | 4.00 | 4.83 | 4.62 | 0.00 | 3.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Horticulture crops | 0.00 | 3.00 | 3.00 | 4.00 | 4.20 | 4.22 | 0.00 | 0.00 | 0.00 | 5.00 | 4.93 | 4.44 | 4.00 | 4.60 | 3.92 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.00 |
| Cattle/Poultry rearing | 0.00 | 0.00 | 0.00 | 0.00 | 4.17 | 4.39 | 0.00 | 0.00 | 0.00 | 0.00 | 4.83 | 4.78 | 0.00 | 0.00 | 2.30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 |
| Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 0.00 | 2.94 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Source: VDSA data

Note: a) 1=2009; 2=2010; 3=2011.

b) Weighted average formula is (rank1*5 + rank2*4 + rank3*3 + rank....)/no. of response (n) related to horticultural crops were obtained from Government department farmers, mass media and research station respectively and similarly the information related to crop output prices were obtained from input dealers, farmers, Government department and mass media.

Table 4.71 gives the source of information; the Farmers have gathered technical and non-technical information from various sources for carrying out farming activity or agriculture. The major source of information related cattle/poultry rearing and disease were Government department, farmers, and mass media. The major source of information related to Crop varieties/Seed collection were obtained from farmers, input dealer, mass media and government department. The major source of information related to use of fertilizers and pesticides were obtained from input dealer, farmers, Government department and mass media. The major source of information related to horticultural crops were obtained from Government department farmers, mass media and research station respectively and similarly the information related to crop output prices were obtained from farmers, mass media and Government department. The information collection from Research station is increasing over the years among the farming community.

**Households borrowings and lendings by farm size in VDSA villages of Karnataka**

Table 4.72 shows the households borrowings and lendings by farm size in Kapanimbargi village. The data shows that large farmers mainly depend on the formal type of borrowings which is in increasing trend from the year 2009 to 2011 (Table 4.72). The formal borrowings were around 93 per cent out of total borrowing in the year 2011. Commercial banks have the major share of more than 50 per cent in all the three years. Medium, small farmers and labours depend on the informal type of borrowings where in depend mainly on friends and relatives.

**Table 4.71: Sources of information in Belladamadagu**

(n=30)

| Particulars | Input Dealer | | | Farmers | | | Non-Government Organization | | | Govt. Department | | | TV, Radio and Media | | | Research Station | | | Others | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Cattle/Poultry disease | 0.00 | 0.00 | 0.00 | 3.67 | 4.13 | 3.29 | 0.00 | 0.00 | 4.14 | 4.88 | 4.88 | 4.46 | 0.00 | 0.00 | 2.33 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 2.91 |
| Crop output prices | 0.00 | 0.00 | 3.00 | 4.60 | 4.85 | 4.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.60 | 3.00 | 0.00 | 2.89 | 0.00 | 0.00 | 0.00 | 4.42 | 4.30 | 4.97 |
| Crop varieties | 4.42 | 4.61 | 4.64 | 4.28 | 4.50 | 4.00 | 0.00 | 0.00 | 0.00 | 3.80 | 3.43 | 3.09 | 2.00 | 0.00 | 2.00 | 0.00 | 4.00 | 2.00 | 5.00 | 0.00 | 3.25 |
| Use of Fertilizer | 4.84 | 4.85 | 4.91 | 3.67 | 4.09 | 3.94 | 0.00 | 0.00 | 0.00 | 3.83 | 3.36 | 3.11 | 0.00 | 0.00 | 2.18 | 0.00 | 0.00 | 3.00 | 5.00 | 0.00 | 2.67 |
| Use of pesticides | 4.84 | 4.91 | 4.91 | 3.72 | 4.03 | 4.00 | 0.00 | 0.00 | 0.00 | 3.74 | 3.25 | 3.04 | 0.00 | 0.00 | 2.20 | 0.00 | 0.00 | 3.00 | 5.00 | 0.00 | 2.80 |
| Seed selection | 4.82 | 0.00 | 3.33 | 4.71 | 5.00 | 5.00 | 0.00 | 0.00 | 0.00 | 4.00 | 0.00 | 3.50 | 4.00 | 0.00 | 3.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.25 |
| Weather information | 0.00 | 0.00 | 0.00 | 4.89 | 4.59 | 5.00 | 0.00 | 0.00 | 0.00 | 3.00 | 0.00 | 3.14 | 4.71 | 4.85 | 3.88 | 0.00 | 0.00 | 3.19 | 0.00 | 0.00 | 0.00 |
| Crop insurance | 0.00 | 0.00 | 0.00 | 4.94 | 4.86 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.90 | 4.86 | 0.00 |
| Input subsidies | 0.00 | 0.00 | 0.00 | 4.20 | 4.60 | 4.31 | 0.00 | 0.00 | 3.50 | 4.94 | 4.67 | 4.43 | 0.00 | 0.00 | 2.72 | 0.00 | 0.00 | 0.00 | 5.00 | 5.00 | 0.00 |
| Horticulture crops | 3.67 | 5.00 | 0.00 | 5.00 | 4.67 | 4.00 | 0.00 | 0.00 | 3.00 | 4.50 | 4.50 | 5.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Cattle/Poultry rearing | 4.00 | 0.00 | 0.00 | 4.78 | 5.00 | 4.07 | 0.00 | 0.00 | 4.57 | 4.40 | 4.00 | 3.62 | 0.00 | 0.00 | 2.30 | 0.00 | 0.00 | 0.00 | 3.83 | 0.00 | 3.83 |
| Others | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.26 | 0.00 | 0.00 | 3.43 | 0.00 | 0.00 | 4.57 | 0.00 | 0.00 | 2.94 | 0.00 | 0.00 | 5.00 | 0.00 | 0.00 | 0.00 |

Source: VDSA data

Note: a) 1=2009; 2=2010; 3=2011.

b) Weighted average formula is (rank1*5 + rank2*4 + rank3*3 + rank….)/no. of response (n)

**Table 4.72: Households borrowings and lendings by farm size in Kapanimbargi village**

| Particulars | Avg. amount of Large | | | Avg. amount of Medium | | | Avg. amount of Small | | | Avg. amount of Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Borrowings** | | | | | | | | | | | | |
| **1. Formal** | | | | | | | | | | | | |
| Cooperative | 8300 | 7000 | 42500 | 6000 | 2700 | 12500 | 6000 | 7100 | 11000 | 0 | 0 | 0 |
| Commercial Banks | 477000 | 439000 | 708000 | 27000 | 19000 | 20000 | 18000 | 2200 | 12000 | 5000 | 3630 | 909 |
| Finance Companies | 23000 | 3900 | 6000 | 0 | 0 | 0 | 0 | 700 | 0 | 0 | 0 | 909 |
| Self Help Groups | 0 | 0 | 0 | 0 | 1000 | 0 | 0 | 0 | 0 | 0 | 500 | 0 |
| Total | 508300 (88.28) | 449900 (89.55) | 756500 (92.59) | 33000 (44.24) | 22700 (48.30) | 32500 (42.60) | 24000 (47.52) | 10000 (18.18) | 23000 (38.85) | 5000 (38.46) | 4130 (27.30) | 1818 (26.66) |
| **2. Informal** | | | | | | | | | | | | |
| Friends and Relatives | 67500 | 52500 | 55500 | 41600 | 24300 | 40500 | 26500 | 25000 | 22200 | 5000 | 11000 | 0 |
| Employer/Landlords | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20000 | 1000 | 1000 | 0 | 0 |
| Money Lenders | 0 | 0 | 5000 | 0 | 0 | 3300 | 0 | 0 | 13000 | 2000 | 0 | 5000 |
| Commission agents/Traders | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Input Dealers/Shop Keepers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 67500 (11.72) | 52500 (10.54) | 60500 (7.41) | 41600 (55.76) | 24300 (51.70) | 43800 (57.40) | 26500 (52.48) | 45000 (81.82) | 36200 (61.15) | 8000 (61.54) | 11000 (72.70) | 5000 (73.34) |
| Grand Total of Formal and Informal Borrowings | 575800 (100) | 502400 (100) | 817000 (100) | 74600 (100) | 47000 (100) | 76300 (100) | 50500 (100) | 55000 (100) | 59200 (100) | 13000 (100) | 15130 (100) | 6818 (100) |
| **3. Lendings** | | | | | | | | | | | | |
| Friends and Relatives | 0 | 3500 | 23000 | 0 | 6700 | 3000 | 0 | 17000 | 26000 | 0 | 2000 | 5909 |
| Tenants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net Borrowings | 567300 | 498900 | 794000 | 74600 | 40300 | 73300 | 50500 | 38000 | 33200 | 13000 | 13130 | 909 |

Source: VDSA data Note: Figures in parentheses indicates percentage to the total borrowings

Table 4.73 gives the households borrowings and lendings by farm size in DFSCFCC Markabbinahalli village. The Table 4.73 highlights that, the large farmers mainly depends on formal type of borrowings except in the year 2011 where the major share of borrowing came from the informal type particularly from friends and relatives. Medium farmers were mainly depend on formal type of borrowings in the year 2009 while the later two years the major share has took by informal type. Labourers mainly depend on informal type of borrowings during 2009 to 2011.

From the Table 4.74 it's observed that, the medium farmers largely depend on informal type of borrowings particularly from friends and relatives. Labourers more or less depend on formal type than informal type. The borrowing for the year 2009 from the labourers was found entirely from formal type particularly commercial banks.

The data shows in the Table 4.75 that, the large farmers mainly depend on the formal type of borrowings. Medium, small farmers and labourers depend on the informal type of borrowings where they depend mainly on friends and relatives. Medium farmers borrowings is showing increasing tend as overall since 2009 to 2011. Small farmers mainly depend on the friends and relatives in informal type for the borrowings.

**Average annual expenditure of food and non-food in VDSA villages of Karnataka**

Table 4.76 shows that the average annual expenditure of food and non-food in GBFS Kappanimbargi village. The Average value of food expenditure per household was Rs.44990 for landless, Rs.35761 for small farmers, Rs.48732 for medium farmers and Rs.56929 for Large in GBFS Kappanimbargi village. The Average value of Non-food expenditure per household was Rs.94334 for landless, Rs.77282 for small farmers, Rs.103134 for medium farmers and Rs.147954 for Large farmers. The

**Table 4.73: Households borrowings and lendings by farm size in Markabbinahalli village**

| Particulars | Avg. amount of Large | | | Avg. amount of Medium | | | Avg. amount of Small | | | Avg. amount of Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** |
| **Borrowings** | | | | | | | | | | | | |
| **1. Formal** | | | | | | | | | | | | |
| Cooperative | 22600 | 23000 | 15580 | 8700 | 8300 | 10200 | 12350 | 4950 | 20100 | 0 | 0 | 0 |
| Commercial Banks | 31000 | 19900 | 5500 | 7600 | 5500 | 8600 | 5000 | 3700 | 4400 | 800 | 0 | 2400 |
| Finance Companies | 0 | 0 | 0 | 0 | 300 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Self Help Groups | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1400 |
| Total | 53600 (66.09) | 42900 (68.20) | 21080 (34.23) | 16300 (65.73) | 14100 (20.49) | 18800 (27.37) | 17350 (63.21) | 8650 (37.04) | 24500 (53.49) | 800 (8.16) | 00 (0.00) | 53600 (11.34) |
| **2. Informal** | | | | | | | | | | | | |
| Friends and Relatives | 27500 | 20000 | 40500 | 8500 | 54700 | 49900 | 10100 | 14700 | 14300 | 9000 | 32600 | 20700 |
| Employer/Landlords | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Money Lenders | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7000 | 0 | 0 | 9000 |
| Commission agents/Traders | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Input Dealers/Shop Keepers | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 27500 (33.91) | 20000 (31.80) | 40500 (65.77) | 8500 (34.27) | 54700 (79.51) | 49900 (72.63) | 10100 (36.79) | 14700 (62.96) | 21300 (46.51) | 9000 (91.84) | 29700 (100.00) | 27500 (88.66) |
| Grand Total of Formal and Informal Borrowings | 81100 | 62900 | 61580 | 24800 | 68800 | 68700 | 27450 | 23350 | 45800 | 9800 | 33500 | 81100 |
| **3. Lendings** | | | | | | | | | | | | |
| Friends and Relatives | 0 | 0 | 1000 | 0 | 0 | 0 | 0 | 0 | 8000 | 0 | 0 | 0 |
| Tenants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net Borrowings | 81100 | 62900 | 60580 | 24800 | 68800 | 68700 | 27450 | 23350 | 37800 | 9800 | 32600 | 33500 |

Source: VDSA data

Note*:* Figures in parentheses indicates percentage to the total borrowings

**Table 4.74: Households borrowings and lendings by farm size in Tharati village**

| Particulars | Avg. amount of Large | | | Avg. amount of Medium | | | Avg. amount of Small | | | Avg. amount of Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Borrowings** | | | | | | | | | | | | |
| **1. Formal** | | | | | | | | | | | | |
| Cooperative | 0 | 0 | 1364 | 1200 | 5000 | 0 | 1800 | 2000 | 3000 | 0 | 0 | 0 |
| Commercial Banks | 30500 | 33000 | 35909 | 0 | 2000 | 7000 | 0 | 0 | 0 | 20000 | 15000 | 12500 |
| Finance Companies | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Self Help Groups | 1000 | 1500 | 0 | 0 | 400 | 1400 | 0 | 0 | 0 | 0 | 0 | 900 |
| Total | 31500 (55.46) | 34500 (46.00) | 37273 (31.04) | 1200 (4.18) | 7400 (14.92) | 8400 (14.95) | 1800 (76.60) | 2000 (9.52) | 3000 (10.83) | 20000 (100.0) | 15000 (49.18) | 13400 (49.98) |
| **2. Informal** | | | | | | | | | | | | |
| Friends and Relatives | 25300 | 40500 | 82818 | 27500 | 42200 | 47800 | 0 | 19000 | 24700 | 0 | 15500 | 13410 |
| Employer/Landlords | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Money Lenders | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Commission agents/Traders | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Input Dealers/Shop Keepers | 0 | 0 | 0 | 0 | 0 | 0 | 550 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 25300 (44.54) | 40500 (54.00) | 82818 (68.96) | 27500 (95.82) | 42200 (85.08) | 47800 (85.50) | 550 (23.40) | 19000 (90.48) | 24700 (89.17) | 0 (0.00) | 15500 (50.82) | 13410 (50.02) |
| Grand Total of Formal and Informal Borrowings | 56800 (100) | 75000 (100) | 120091 (100) | 28700 (100) | 49600 (100) | 56200 (100) | 2350 (100) | 21000 (100) | 27700 (100) | 20000 (100) | 30500 (100) | 26810 (100) |
| **3. Lendings** | | | | | | | | | | | | |
| Friends and Relatives | 0 | 0 | 0 | 0 | 0 | 5000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Tenants | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 0 | 0 |
| Net Borrowings | 56800 | 75000 | 120091 | 28700 | 49600 | 51200 | 19850 | 21000 | 26700 | 41500 | 30500 | 26810 |

Source: VDSA data

Note: Figures in parentheses indicates percentage to the total borrowings

**Table 4.75: Households borrowings and lendings by farm size in Belladamadagu village**

| Particulars | Avg. amount of Large | | | Avg. amount of Medium | | | Avg. amount of Small | | | Avg. amount of Labour | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Borrowings** | | | | | | | | | | | | |
| **1. Formal** | | | | | | | | | | | | |
| Cooperative | 9400 | 16500 | 16500 | 2500 | 2500 | 2500 | 1600 | 2000 | 2000 | 400 | 0 | 0 |
| Commercial Banks | 33700 | 1200 | 1200 | 0 | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 0 |
| Finance Companies | 0 | 3500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Self Help Groups | 8300 | 13650 | 15200 | 8400 | 8520 | 7000 | 7500 | 7800 | 5000 | 4800 | 4200 | 5500 |
| Total | 51400 (59.11) | 34850 (58.33) | 32900 (63.39) | 10900 (48.66) | 11020 (43.35) | 5000 (32.26) | 9100 (29.64) | 9800 (37.26) | 7000 (34.15) | 6200 (35.84) | 4200 (22.34) | 5500 (34.38) |
| **2. Informal** | | | | | | | | | | | | |
| Friends and Relatives | 22000 | 11500 | 15000 | 6000 | 13500 | 8500 | 14000 | 8500 | 10500 | 600 | 13100 | 2200 |
| Employer/Landlords | 7200 | 0 | 0 | 4000 | 0 | 0 | 4200 | 3000 | 0 | 9000 | 0 | 0 |
| Money Lenders | 0 | 8600 | 4000 | 200 | 500 | 1000 | 1000 | 4800 | 3000 | 0 | 1500 | 8300 |
| Commission agents/Traders | 0 | 0 | 0 | 0 | 0 | 1000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Input Dealers/Shop Keepers | 5000 | 4800 | 0 | 1300 | 400 | 0 | 1900 | 200 | 0 | 1500 | 0 | 0 |
| Others | 1350 | 0 | 0 | 0 | 0 | 0 | 500 | 0 | 0 | 0 | 0 | 0 |
| Total | 35550 (40.89) | 24900 (41.67) | 19000 (36.61) | 11500 (51.34) | 14400 (56.65) | 10500 (67.74) | 21600 (70.36) | 16500 (62.74) | 13500 (65.85) | 11100 (64.16) | 14600 (77.66) | 10500 (65.63) |
| Grand Total of Formal and Informal Borrowings | 86950 (100) | 59750 (100) | 51900 (100) | 22400( 100) | 25420 (100) | 15500 (100) | 30700 (100) | 26300 (100) | 20500 (100) | 17300 (100) | 18800 (100) | 16000 (100) |
| **3. Lendings** | | | | | | | | | | | | |
| Friends and Relatives | 1000 | 0 | 0 | 300 | 0 | 2000 | 3000 | 100 | 0 | 0 | 300 | 6500 |
| Tenants | 0 | 0 | 0 | 0 | 0 | 2000 | 0 | 0 | 0 | 0 | 0 | 0 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Net Borrowings | 85950 | 59750 | 51900 | 22100 | 25420 | 16000 | 27700 | 26200 | 20500 | 17300 | 18500 | 9500 |

Source: VDSA data Note: Figures in parentheses indicates percentage to the total borrowings

**Table 4.76: Average annual expenditure of food and non-food in Kappanimbargi village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** |
| **1. Food Items** | | | | | | | | | | | | |
| Total value for food per Household | 38641.65 | 44847.45 | 51482.64 | 27455.20 | 36151.90 | 43676.80 | 41968.35 | 47933.50 | 56294.70 | 55677.60 | 52912.00 | 62197.75 |
| Average food expenditure per member | 6334.70 | 7352.04 | 10112.66 | 6696.39 | 8817.54 | 11804.54 | 7235.92 | 7262.65 | 8278.63 | 7326.00 | 7558.86 | 8760.25 |
| **2. All Non-food items** | | | | | | | | | | | | |
| Total value of all non food items Household | 23864.60 | 48478.20 | 75689.45 | 26074.00 | 46734.70 | 51753.80 | 26809.20 | 44985.80 | 91411.00 | 43756.90 | 111438.90 | 117881.20 |
| Average non-food expenditure per member | 3912.23 | 7947.25 | 14867.57 | 6359.51 | 11398.71 | 13987.51 | 4622.28 | 6816.03 | 13442.79 | 5757.49 | 15919.84 | 16602.99 |
| Average food and non-food expenditure per member | 10246.93 | 15299.29 | 24980.23 | 13055.90 | 20216.24 | 25792.05 | 11858.20 | 14078.68 | 21721.43 | 13083.49 | 23478.70 | 25363.23 |
| Average expenditure for food and non-food per household | 62506.25 | 93325.65 | 127172.09 | 53529.20 | 82886.60 | 95430.60 | 68777.55 | 92919.30 | 147705.70 | 99434.50 | 164350.90 | 180078.95 |

Source: VDSA data

average value of food expenditure per household forms almost 50 percent of the total expenditure in the case of all the category of farmers except large framers (<40%). The growth rate in the food expenditure over the years is around 19 % across different category of the farmers except large farmers which is about 6 per cent and in the case of non-food expenditure is about 68 % across different category of the farmers except large farmers which is about 64 per cent.

The result presented in the Table 4.77 indicates that, the Average value of food expenditure per household was Rs.35474, Rs.31085, Rs.34686 and Rs.42862 for landless, small, medium and Large farmers respectively. The Average value of Non-food expenditure per household was Rs.47916 for landless, Rs.27833 for small farmers, Rs.36210 for medium farmers and Rs.63977 for Large farmers. The average value of food expenditure per household forms almost 50 percent of the total expenditure in the case of all the category of farmers except large framers (<40%) and it is paradox that the average value total expenditure per household is higher in case of landless laborers than small farmers. The growth rate in the food expenditure over the years is around 11 % across different category of the farmers except large farmers which is about -2.6 per cent and in the case of non-food expenditure is about 19.5 % across different category of the farmers except large farmers which is about 23 per cent.

The results presented in the Table 4.78 gives the average annual expenditure of food and non-food in Belladamadugu village. The average value of food expenditure per household was Rs.21969 for landless, Rs.25914 for small farmers, Rs.26315 for medium farmers and Rs.34185 for Large. The Average value of Non-food expenditure per household was Rs.21769 for landless, Rs.31876 for small farmers, Rs.26052 for medium farmers and Rs.44155 for Large farmers.

**Table 4.77: Average annual expenditure of food and non-food in Markabbinahalli village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** |
| **1. Food Items** | | | | | | | | | | | | |
| Total value for food per Household | 30957.13 | 34038.21 | 41427.93 | 30175.14 | 28971.17 | 34107.85 | 31879.25 | 32413.25 | 39764.55 | 45739.13 | 39429.14 | 43416.65 |
| Average food expenditure per member | 5732.80 | 6188.76 | 7397.84 | 5486.39 | 5173.42 | 5983.83 | 5903.56 | 5686.54 | 6739.75 | 10164.25 | 8046.76 | 8683.33 |
| **2. All Non-food items** | | | | | | | | | | | | |
| Total value of all non food items Household | 42466.80 | 36912.60 | 64368.40 | 25010.30 | 24872.10 | 33616.90 | 25536.60 | 46614.80 | 36479.50 | 53537.90 | 57499.40 | 80892.70 |
| Average non-food expenditure per member | 7864.22 | 6711.38 | 11494.36 | 4547.33 | 4441.45 | 5897.70 | 4729.00 | 8178.04 | 6182.97 | 11897.31 | 11734.57 | 16178.54 |
| Average food and non-food expenditure per member | 13597.02 | 12900.15 | 18892.20 | 10033.72 | 9614.87 | 11881.54 | 10632.56 | 13864.57 | 12922.72 | 22061.56 | 19781.34 | 24861.87 |
| Average expenditure for food and non-food per household | 30957.13 | 34038.21 | 41427.93 | 30175.14 | 28971.17 | 34107.85 | 31879.25 | 32413.25 | 39764.55 | 45739.13 | 39429.14 | 43416.65 |

Source: VDSA data

**Table 4.78: Average annual expenditure of food and non-food in Belladamadugu village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** |
| **1. Food Items** | | | | | | | | | | | | |
| Total value for food per Household | 21092.33 | 19472.75 | 25340.51 | 24743.60 | 22917.73 | 30079.45 | 23466.82 | 22956.24 | 32522.60 | 33261.03 | 29171.29 | 40123.36 |
| Average food expenditure per member | 5700.63 | 4993.01 | 6668.55 | 5498.58 | 4876.11 | 6399.88 | 4789.15 | 4684.95 | 6376.98 | 5452.63 | 5117.77 | 7164.89 |
| **2. All Non-food items** | | | | | | | | | | | | |
| Total value of all non food items Household | 18037.00 | 22167.70 | 25103.30 | 22157.10 | 27935.70 | 45535.10 | 27142.40 | 18476.70 | 32536.30 | 37040.70 | 30239.90 | 65184.50 |
| Average non-food expenditure per member | 4874.86 | 5684.03 | 6606.13 | 4923.80 | 5943.77 | 9688.32 | 5539.27 | 3770.76 | 6379.67 | 6072.25 | 5305.25 | 11640.09 |
| Average food and non-food expenditure per member | 10575.49 | 10677.04 | 13274.69 | 10422.38 | 10819.88 | 16088.20 | 10328.41 | 8455.70 | 12756.65 | 11524.87 | 10423.02 | 18804.98 |
| Average expenditure for food and non-food per household | 39129.33 | 41640.45 | 50443.81 | 46900.70 | 50853.43 | 75614.55 | 50609.22 | 41432.94 | 65058.90 | 70301.73 | 59411.19 | 105307.86 |

Source: VDSA data

The results presented in the Table 4.79 revealed that, the average value of food expenditure per household was Rs.18040, Rs.20536, Rs.22937 and Rs.33073 for landless, small, medium and large farmers respectively. The average value of Non-food expenditure per household was Rs.17763 for landless, Rs.26220 for small farmers, Rs.32206 for medium farmers and Rs.49901 for Large farmers.

**Household level summary in VDSA villages of Karnataka**

Table 4.80 reveals that, the household level summary in GBFS Kappanimbargi village. The average value of food expenditure per member was Rs.7993 for landless, Rs.9106 for small farmers, Rs.7593 for medium farmers and Rs.7882 for Large farmers, The Average value of Non-food expenditure per member was Rs.16842 for landless, Rs.19688 for small farmers, Rs.15886 for medium farmers and Rs.20642 for Large farmers, The Average Non-farm income was Rs.68272 for landless, Rs.74333 for small farmers, Rs.66849 for medium farmers and Rs.160177 for Large farmers, The Average Net borrowings per household was Rs.9013 for landless, Rs.40567 for small farmers, Rs.62733 for medium farmers and Rs.620067 for Large farmers, The Average asset value per household was Rs.236036 for landless, Rs.452082 for small farmers, Rs.863677 for medium farmers and Rs.4699395 for Large farmers.

Table 4.81 shows that, the average value of food expenditure per member was Rs.6440 for landless, Rs.5548 for small farmers, Rs.6110 for medium farmers and Rs.8965 for Large farmers. The Average value of Non-food expenditure per member was Rs.15130 for landless, Rs.10510 for small farmers, Rs.12474 for medium farmers and Rs.22235 for Large farmers, The Average Non-farm income was Rs.43835 for landless, Rs.32930 for small farmers, Rs.55615 for medium farmers and Rs.81560 for Large farmers.

**Table 4.79: Average annual expenditure of food and non-food in Tharati village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **1. Food Items** | | | | | | | | | | | | |
| Total value for food per Household | 19247.80 | 17085.90 | 17786.50 | 21982.3 | 19614.45 | 20011.60 | 27340.86 | 19614.45 | 21856.10 | 38395.30 | 30535.35 | 30289.32 |
| Average food expenditure per member | 5065.21 | 4881.69 | 5231.32 | 4778.76 | 4358.77 | 4653.86 | 5468.172 | 4358.77 | 4751.33 | 6192.79 | 5005.80 | 5647.16 |
| **2. All Non-food items** | | | | | | | | | | | | |
| Total value of all non food items Household | 4974.03 | 21489.80 | 26825.30 | 21076.5 | 30660.10 | 26924.40 | 38577 | 30660.10 | 27380.90 | 78087.20 | 32886.30 | 38729.18 |
| Average non-food expenditure per member | 10039.24 | 6139.94 | 7889.79 | 4581.848 | 6813.36 | 6261.49 | 7715.4 | 6813.36 | 5952.37 | 12594.71 | 5391.20 | 7220.69 |
| Average food and non-food expenditure per member | 38149.10 | 11021.63 | 13121.12 | 9360.609 | 11172.12 | 10915.35 | 13183.57 | 11172.12 | 10703.70 | 18787.50 | 10396.99 | 12867.86 |
| Average expenditure for food and non-food per household | 19247.80 | 38575.70 | 44611.80 | 43058.8 | 50274.55 | 46936.00 | 65917.86 | 50274.55 | 49237.00 | 116482.50 | 63421.65 | 69018.50 |

Source: VDSA data

**Table 4.80: Household level summary in Kappanimbargi village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| Total Asset value per household | 173567 | 246741 | 287801 | 309642 | 426352 | 620252 | 604760 | 734705 | 1251566 | 3523313 | 3670950 | 6903922 |
| Average asset value per hectare of farm | 0 | 277143 | 1360759 | 290935 | 237814 | 389998 | 292734 | 307447 | 365784 | 393684 | 528925 | 933252 |
| Farm income per household | 27756 | 44989 | 34179 | 32957 | 48285 | 30235 | 52614 | 118712 | 75209 | 405404 | 572108 | 531076 |
| Non Farm income per household | 52784 | 55115 | 96918 | 53949 | 58342 | 110709 | 33689 | 47115 | 119744 | 212967 | 80051 | 187512 |
| Net borrowings per household | 13000 | 13130 | 909 | 50500 | 38000 | 33200 | 74600 | 40300 | 73300 | 567300 | 498900 | 794000 |
| Total food and non-food expenditure per household | 62506 | 93326 | 127172 | 53529 | 82887 | 95431 | 68778 | 92919 | 147706 | 99435 | 164351 | 180079 |
| Food expenditure per member | 6335 | 7352 | 10113 | 6696 | 8818 | 11805 | 7236 | 7263 | 8279 | 7326 | 7559 | 8760 |
| Total food and non-food expenditure per member | 10247 | 15299 | 24980 | 13056 | 20216 | 25792 | 11858 | 14079 | 21721 | 13083 | 23479 | 25363 |
| Other Expenditure | 48207 | 13701 | 8925 | 39140 | 51901 | 82080 | 17138 | 15030 | 23349 | 101893 | 56617 | 16493 |

Source: VDSA data

**Table 4.81: Household level summary in Markabbinahalli village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| Total Asset value per household | 101409 | 134475 | 163739 | 373217 | 536397 | 831481 | 796799 | 1025383 | 1945544 | 4016935 | 4888732 | 8137695 |
| Average asset value per hectare of farm | 0 | 0 | 1011356 | 424014 | 244328 | 632208 | 354764 | 456537 | 866226 | 392724 | 567817 | 1282860 |
| Farm income per household | 26291 | 47892 | 46319 | 44200 | 80929 | 76224 | 71775 | 93374 | 74003 | 127086 | 199008 | 241344 |
| Non Farm income per household | 30813 | 41456 | 59235 | 23752 | 24664 | 50374 | 21652 | 70305 | 74889 | 59831 | 80170 | 104680 |
| Net borrowings per household | 9800 | 32600 | 33500 | 27450 | 23350 | 37800 | 24800 | 68800 | 68700 | 81100 | 62900 | 60580 |
| Total food and non-food expenditure per household | 73424 | 70951 | 105796 | 55185 | 53843 | 67725 | 57416 | 79028 | 76244 | 99277 | 96929 | 124309 |
| Food expenditure per member | 5733 | 6189 | 7398 | 5486 | 5173 | 5984 | 5904 | 5687 | 6740 | 10164 | 8047 | 8683 |
| Total food and non-food expenditure per member | 13597 | 12900 | 18892 | 10034 | 9615 | 11882 | 10633 | 13865 | 12923 | 22062 | 19781 | 24862 |
| Other Expenditure | 12081 | 17066 | 16938 | 22355 | 16351 | 10741 | 45520 | 7311 | 11630 | 48464 | 24302 | 23332 |

Source: VDSA data

The average net borrowings per household was Rs.25300 for landless, Rs.29533 for small farmers, Rs.54100 for medium farmers and Rs.68193 for large farmers. The Average asset value per household was Rs.133208 for landless, Rs.580365 for small farmers, Rs.1255909 for medium farmers and Rs.5681121 for Large farmers.

Table 4.82 gives the household level summary in FBFSGM Tharati village. The Average value of food expenditure per member was Rs.5059, Rs.4597, Rs.4963 and Rs.5615 for landless, small, medium and large farmers respectively. The average value of non-food expenditure per member was Rs.11394 for landless, Rs.10483 for small farmers, Rs.11057 for medium farmers and Rs.14018 for large farmers. The average non-farm income was Rs.54507 for landless, Rs.70631 for small farmers, Rs.55846 for medium farmers and Rs.93741 for Large farmers. The average net borrowings per household was Rs.32937 for landless, Rs.22517for small farmers, Rs.43167 for medium farmers and Rs.83964 for Large farmers. The Average asset value per household was Rs.124458 for landless, Rs.230731 for small farmers, Rs.365412 for medium farmers and Rs.806322 for Large farmers.

Table 4.83 envisaged the household summary level in GBFSD Belladamadagu village. The average value of food expenditure per member was Rs.5788 for landless, Rs.5592 for small farmers, Rs.5284 for medium farmers and Rs.5912 for Large farmers. The Average value of Non-food expenditure per member was Rs.11509 for landless, Rs.12443 for small farmers, Rs.10514 for medium farmers and Rs.13584 for Large farmers. The Average non-farm income was Rs.38781 for landless, Rs.91710 for small farmers, Rs.56523 for medium farmers and Rs.75076 for Large farmers, The Average Net borrowings per household was Rs.15100 for landless, Rs.24800 for small farmers, Rs.21173 for medium farmers and Rs.65867 for Large farmers. The average asset value per

**Table 4.82: Household level summary in Tharati village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** | **2009** | **2010** | **2011** |
| **Total Asset value per household** | 88440 | 117264 | 167670 | 190561 | 217584 | 284047 | 313023 | 352141 | 431073 | 711830 | 750998 | 956139 |
| **Average asset value per hectare of farm** | 1249148 | 772493 | 1035641 | 724567 | 632511 | 597364 | 720255 | 733627 | 797251 | 623755 | 658078 | 932545 |
| **Farm income per household** | 9644 | 16032 | 32226 | 26583 | 49273 | 108722 | 29710 | 52248 | 63542 | 342690 | 97093 | 94496 |
| **Non Farm income per household** | 58621 | 48500 | 56400 | 64298 | 63798 | 83798 | 57475 | 44964 | 65100 | 72997 | 80854 | 127372 |
| **Net borrowings per household** | 41500 | 30500 | 26810 | 19850 | 21000 | 26700 | 28700 | 49600 | 51200 | 56800 | 75000 | 120091 |
| **Total food and non-food expenditure per household** | 38149 | 38576 | 44612 | 43059 | 50275 | 46936 | 65918 | 42705 | 49237 | 116483 | 63422 | 69019 |
| **Food expenditure per member** | 5065 | 4882 | 5231 | 4779 | 4359 | 4654 | 5468 | 4670 | 4751 | 6193 | 5006 | 5647 |
| **Total food and non-food expenditure per member** | 10039 | 11022 | 13121 | 9361 | 11172 | 10915 | 13184 | 9284 | 10704 | 18788 | 10397 | 12868 |
| **Other Expenditure** | 1912 | 6826 | 15648 | 5407 | 2929 | 22940 | 4515 | 20419 | 8672 | 7050 | 57319 | 16278 |

Source: VDSA data

**Table 4.83: Household level summary in Belladamadugu village (Rs.)**

| Particulars | Labour | | | Small | | | Medium | | | Large | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 | 2009 | 2010 | 2011 |
| **Total Asset value per household** | 84685 | 122074 | 211154 | 255549 | 257929 | 375326 | 256961 | 231435 | 414161 | 579177 | 589565 | 883435 |
| **Average asset value per hectare of farm** | 440608 | 182828 | 254524 | 414113 | 404658 | 608210 | 196589 | 185683 | 332286 | 214407 | 218252 | 327041 |
| **Farm income per household** | 12896 | 39542 | 28249 | 44868 | 49085 | 46846 | 22189 | 34613 | 36755 | 25798 | 40343 | 27813 |
| **Non Farm income per household** | 17261 | 28009 | 71072 | 74204 | 65884 | 135042 | 42521 | 40673 | 86376 | 39631 | 69422 | 116174 |
| **Net borrowings per household** | 17300 | 18500 | 9500 | 27700 | 26200 | 20500 | 22100 | 25420 | 16000 | 85950 | 59750 | 51900 |
| **Total food and non-food expenditure per household** | 39129 | 41640 | 50444 | 46901 | 50853 | 75615 | 50609 | 41433 | 65059 | 70302 | 59411 | 105308 |
| **Food expenditure per member** | 5701 | 4993 | 6669 | 5499 | 4876 | 6400 | 4789 | 4685 | 6377 | 5453 | 5118 | 7165 |
| **Total food and non-food expenditure per member** | 10575 | 10677 | 13275 | 10422 | 10820 | 16088 | 10328 | 8456 | 12757 | 11525 | 10423 | 18805 |
| **Other Expenditure** | 13627 | 4285 | 10781 | 38845 | 4053 | 8415 | 38500 | 4524 | 11593 | 38136 | 5326 | 19511 |

Source: VDSA data

household was Rs.139304 for landless, Rs.296268 for small farmers, Rs.300852 for medium farmers and Rs.684059for Large farmers.

**Average amount of benefits received by the beneficiary households from Government welfare programs in VDSA villages of Karnataka**

In GBFS Kappanimbargi, 20 developmental programs were listed, while 10 developmental programs benefited the households in each year during 2009 to 2011. Shift in the developmental programmes in GBFS Kappanimbargi are indicated in Table 4.84. On an average benefits from Public Distribution System (PDS) was Rs.765, Rs.772 and Rs.848 respectively, during 2009, 2010 and 2011. About 38 to 39 number of households was availing benefit from PDS while only 2 are benefiting from subsidy on purchase of agricultural implements. About 27 households are getting benefit from drought relief followed by Bhagya Jyothi (25), Agriculture input subsidy / crop production program (17), Mid day meal scheme (17 ), Anganwadi (12), Pensions (old age, widow, etc) (11), waste land development and other (2) during 2009. In 2010, we find free education trip by ICRISAT which provides benefits to 34 households with average benefit of Rs.2044 to each household followed by followed by free seed by ICRISAT (24) and allotment of house/subsidy on construction (11). In 2011, we find different programs like soil and water conservation program, suvarna bhoomi Yojane, subsidy on horticulture and supply of implements to artisans.

In DFSCFCC Markabbinahalli, 10 developmental programs were listed, while there is variation in the developmental programs benefited the households in each year during 2009 to 2011. Shift in the developmental programmes in DFSCFCC Markabbinahalli are indicated in Table 4.85. On an average benefits from Public Distribution System (PDS) was Rs.1652, Rs.1465 and Rs.1347 respectively, during 2009, 2010 and 2011. About 39 to 40 households are availing benefit from PDS

**Table 4.84: Average amount of benefits received by the beneficiary households from government welfare programs in Kappanimbargi**

| Name of Program | 2009 | | 2010 | | 2011 | |
|---|---|---|---|---|---|---|
| | No. of Households | Avg. Amount/ Household (Rs.) | No. of House holds | Avg. Amount/ Household (Rs.) | No. of House holds | Avg. Amount/ Household (Rs.) |
| Public dist. System (rice,wheat, etc.) | 38 | 765 | 38 | 772 | 39 | 848 |
| Drought/Flood relief | 27 | 6,300 | | | | |
| Bhagya Jyothi (Free electricity) | 25 | 2,599 | | | | |
| Agriculture input subsidy / crop production program | 17 | 968 | | | | |
| Mid day meal scheme | 17 | 2,912 | 21 | 3,039 | 21 | 2,682 |
| Anganwadi | 12 | 788 | | | | |
| Pensions (old age, widow, etc.) | 11 | 4,073 | 14 | 4,800 | 16 | 5,575 |
| Others | 2 | 6,750 | 1 | 1,00,000 | 2 | 4,500 |
| Subsidy on purchase of agril. impl./mach. | 2 | 4,155 | 2 | 6,900 | | |
| Wasteland development | 2 | 10,000 | | | | |
| Free education trip by ICRISAT | | | 34 | 2,044 | | |
| Free seed by ICRISAT | | | 24 | 486 | | |
| Allotment of house/Subsidy on construction | | | 11 | 595 | | |
| National rural emp. guarantee scheme(NREGS) | | | 1 | 30,000 | | |
| Subsidy on education (Free book/food/uniform/scholorship/hostel etc) | | | 1 | 360 | 1 | 400 |
| Subsidies (Inputs, house & toilets, etc.) | | | | | 5 | 400 |
| Soil & water conservation program | | | | | 2 | 9,250 |
| Suvarnabhoomi Yojana | | | | | 2 | 4,350 |
| Subsidy on horticulture | | | | | 1 | 1,250 |
| Supply of implements to artisans | | | | | 1 | 2,500 |

Source: VDSA data

**Table 4.85: Average amount of benefits received by the beneficiary households from government welfare programs in Markabbinahalli**

| Name of Program | 2009 | | 2010 | | 2011 | |
|---|---|---|---|---|---|---|
| | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) |
| Public dist. System (rice,wheat, etc.) | 39 | 1,652 | 40 | 1,465 | 40 | 1,347 |
| Mid day meal scheme | 21 | 1,780 | 23 | 2,066 | 26 | 1,870 |
| Drought/Flood relief | 15 | 5,440 | | | | |
| Anganwadi | 11 | 830 | | | | |
| Pensions (old age, widow, etc.) | 10 | 5,760 | 15 | 4,667 | 15 | 4,533 |
| Pension for physically handicapped | 3 | 4,800 | | | | |
| Women self-help groups (SHG/DWCRA) | 3 | 7,333 | | | | |
| Subsidy on purchase of agril. impl./mach. | 2 | 10,200 | 2 | 9,250 | | |
| Agriculture input subsidy / crop production program | 1 | 1,800 | | | | |
| Arogya shree/Any other health program | | | | | 1 | 80,000 |

Source: VDSA data

while only 1 are benefiting from agricultural input and arogya shree program. About 21, 23 and 26 respectively households are getting benefit of Rs.1780, Rs.2066 and 1870 respectively from mid day meal scheme during 2009, 2010 and 2010. Pensions (old age, widow etc.) will provides average benefit of Rs.5760, Rs.4667 and Rs.4553 respectively during 2009, 2010 and 2011.

In FBFSGM Tharati, 14 developmental programs were listed, while 7 developmental programs benefited the households in 2009 and 10 development programs benefited in 2010 and 2011. Shift in the developmental programmes in FBFSGM Tharati are indicated in Table 4.86. On an average benefits from Public Distribution System (PDS) was Rs.3108, Rs.3110 and Rs.3866 respectively, during 2009, 2010 and 2011. About 39 households was availing benefit from PDS in each year from 2009 to 2011. About 21 households are getting benefit from midday meal scheme followed by Bhagya Jyothi (15), Anganwadi (3) during 2009. In 2010, we find midday meal scheme provides benefits to 24 households with average benefit of Rs.2044 to each household followed by subsidy on education (15) and pension (7). In 2011, we find different programs like free cycle by Government and suvarna bhoomi Yojana.

In GBFSD Belladamadagu, 14 developmental programs were listed, while 9 developmental programs benefited the households in 2009 and 10 development programs benefited in 2010 and only 6 developmental programs benefited in 2011. Shift in the developmental programmes in GBFSD Belladamadagu are indicated in Table 4.87. On an average benefits from Public Distribution System (PDS) was Rs.1124, Rs.1854 and Rs.3603 respectively, during 2009, 2010 and 2011. About 37 households was availing benefit from PDS in 2009 and 40 households are benefited in each year from 2010 to 2011. About 18 households are getting benefit from midday meal scheme followed by women self help

**Table 4.86: Average amount of benefits received by the beneficiary households from government welfare programs in Tharati**

| Name of Program | 2009 | | 2010 | | 2011 | |
|---|---|---|---|---|---|---|
| | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) |
| Public dist. System (rice,wheat, etc.) | 39 | 3,108 | 39 | 3,110 | 39 | 3,866 |
| Mid day meal scheme | 21 | 4,000 | 24 | 4,002 | 20 | 2,640 |
| Bhagya Jyothi (Free electricity) | 15 | 2,000 | 3 | 270 | 3 | 195 |
| Anganwadi | 3 | 3,200 | 2 | 240 | 4 | 875 |
| Allotment of house/Subsidy on construction | 1 | 3,000 | | | | |
| Pension for physically handicapped | 1 | 4,800 | | | | |
| Pensions (old age, widow, etc.) | 1 | 4,800 | 7 | 4,686 | 7 | 5,686 |
| Subsidy on education (Free book/food/uniform/scholorship/ hostel etc) | | | 15 | 791 | 14 | 1,263 |
| Arogya shree/Any other health program | | | 1 | 700 | 3 | 5,000 |
| Deepam padakam (LPG connection) | | | 1 | 2,500 | | |
| Member of panchayat honorarium | | | 1 | 3,000 | | |
| Others | | | 1 | 30,000 | 3 | 1,000 |
| Free cycle by govt./school | | | | | 3 | 2,833 |
| Suvarnabhoomi Yojana | | | | | 3 | 3,773 |

Source: VDSA data

**Table 4.87: Average amount of benefits received by the beneficiary households from government welfare programs in Belladamadagu**

| Name of Program | 2009 | | 2010 | | 2011 | |
|---|---|---|---|---|---|---|
| | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) | No. of Households | Avg. Amount/ Household (Rs.) |
| Public dist. System (rice,wheat, etc.) | 37 | 1,124 | 40 | 1,854 | 40 | 3,603 |
| Mid day meal scheme | 18 | 3,203 | 20 | 2,923 | 17 | 2,349 |
| Women self-help groups (SHG/DWCRA) | 14 | 9,429 | | | | |
| Anganwadi | 6 | 1,284 | 6 | 479 | | |
| Allotment of house/Subsidy on construction | 5 | 40,000 | | | | |
| Bhagya Jyothi (Free electricity) | 4 | 576 | 9 | 354 | | |
| Pensions (old age, widow, etc.) | 4 | 4,800 | 8 | 4,128 | | |
| Others | 1 | 3,00,000 | 2 | 10,070 | | |
| Pension for physically handicapped | 1 | 4,800 | 2 | 52,500 | 8 | 5,213 |
| Subsidy on education (Free book/food/uniform/scholorship/hostel etc | | | 13 | 452 | 11 | 627 |
| Subsidy on purchase of agril. impl./mach. | | | 3 | 2,500 | | |
| Arogya shree/Any other health program | | | 1 | 700 | | |
| Suvarnabhoomi Yojana | | | | | 3 | 8,333 |
| Free cycle by govt./school | | | | | 1 | 2,500 |

Source: VDSA data

groups (14) and Anganwadi (6) during 2009. In 2010, we find midday meal scheme provides benefits to 20 households with average benefit of Rs.2923 to each household followed by Bhagya Jyothi (9) and pension (8). In 2011, we find less number of development programs as compared to 2009 and 2010 and different programs like pension for physically handicapped, suvarna bhoomi Yojana and free cycle by Government.

# DISCUSSION

# CHAPTER V

# DISCUSSION

In this chapter, the results of the study are discussed under the following headings.

5.1 Assets of sample farmers

5.2 Socio-Economic features of sample farmers

5.3 Cropping pattern

5.4 Dimensions of agriculture growth in Bijapur and Tumkur districts of Karnataka

5.5 Transitional probabilities of Land use and cropping pattern in Tumkur and Bijapur districts of Karnataka using Markov chain analysis (macro data)

5.6 Transitional probabilities of cropping pattern of sample farmers in the study area using Markov chain analysis (Meta data)

5.7 Sources of information and supply of new technology inputs and the markets for different crops

5.8 Marketable surplus of sample farmers

5.9 Costs and return structure of sample farmers

5.10 Relative economic performance of the most vulnerable rainfed areas in Northern and Southern Karnataka (Rs. )

5.11 Transaction cost and benefits of sample farmers from development programs

5.12 Water market in Tharati

## 5.1 Assets of sample farmers

Here results from Grapes Based Farming System (GBFS) Kappanimbargi and Diversified Farming System with a Combination of Food and Commercial Crops (DFSCFCC) Markabbinahalli, Floriculture Based Farming System with Groundwater Markets (FBFSGM) Tharati, Groundnut Based Farming System with Dairy as Main Enterprise (GBFSD) Belladamadugu villages are discussed. In the case of FBFSGM Tharati, GBFSD Belladamadugu and GBFS Kappanimbargi the farmers are using groundwater irrigation while in the case of DFSCFCC Markabbinahalli farmers are dependent on rainfall and the village has fertile black cotton soils. In DFSCFCC Markabbinahalli, Drinking water is an acute problem in the village and the available water is brackish. Hence, there is no groundwater facility in the village. Due to illegal sand mining the number of tractors increased by 40 per cent per year in FBFSGM Tharati and villagers are receiving appreciable off farm income from sand mining activities. In GBFS Kappanimbargi, the number of tractors increased by 10 per cent per year because of drought the farmers not purchased the tractors. The highest number of cross breed cows was (100) observed in GBFSD Belladamdugu during 2010. Hence, the villagers selling milk to dairy of about 500 liters per day which improved the economic condition of many households. Due to rainfed condition the number of cross breed cows was (9) less in DFSCFCC Markabbinahalli during 2010.

## 5.2 Socio-Economic features in MVRANK Bijapur district

The average family size was around four members and the average age of the head of the family ranged from 42 to 53 years (Table 4.1). The size of holding by sample farmers in GBFS Kappanimbargi was 8.67 acres which is lower when compared with (11.85 acres) sample farmers of DFSCFCC Markabbinahalli (by 27 %). However the net returns per acre was decreasing of Rs. 335 per acre for rainfed farmers in GBFS Kappanibargi while that in DFSCFCC Markabinahalli was Rs. 4179. The difference in net returns per acre is due to severe drought in GBFS Kappanimbargi during 2012-13.

The market value of land per acre was Rs.2.36 lakhs for rainfed farms, Rs.3 lakh for farms buying irrigation water and Rs.7.3 lakh for farms with irrigation facility in FBFSGM Tharati. In the case of GBFSD Belladamadugu, the land value per acre was Rs.1.3 lakh and Rs.3.5 lakh for rainfed farms and farms with irrigation facility respectively. The land value per acre was higher in the case of Tharati village compared to GBFSD Belladmadagu due to good connectivity of roads. The land value per acre was Rs.3.3 lakh for rainfed farms and Rs.8.3 lakh for farms with irrigation facility in GBFS Kappanimbargi while in the case of DFSCFCC Markabbinahalli, the land value was comparatively high for rainfed farms (Rs. 4.2 lakhs per acre) because of black cotton soils.

**Socio-Economic features in MVRASK Tumkur district**

The average family size was around four members and the average age of the head of the family ranged from 51 to 57 years. In FBFSGM Tharati, the holding size of 0.97 acre for rainfed farmers was lower than 3.23 acres for rainfed farmers of GBFSD Belladamadagu (Table 4.2) by around 70 per cent. this results that, the net returns per acre is (Rs. 7741) higher in GBFSD Belladamadugu compared to (Rs. 7005) in FBFSGM Tharati and majority of the rainfed farmers cultivating Ragi as rainfed crop while in GBFSD Belladamadugu groundnut is act as commercial crop. Hence, the net return was higher in GBFSD Belladamadugu compared to FBFSGM Tharati.

The proportion of area irrigated in FBFSGM Tharati is 24 per cent compared to 8 per cent in GBFSD Belladamadugu. It indicates that the percentage of area irrigated is higher in FBFSGM Tharati. The net return per acre was the highest from chrysanthemum flower crop in FBFSGM Tharati, fetching Rs.82547 per acre while the net return per household is the highest from paddy crop being Rs. 6362 per acre in GBFSD Belladamadugu. Hence, the net returns per acre will be higher in FBFSGM Tharati for irrigated farmers compared to GBFSD Belladamadugu because chrysanthemum is low water, high value crop.

**Possession of livestock in MVRANK Bijapur district**

In GBFS Kappanimbargi, among the bovines possessed by rainfed farmers, indigenous cows formed 54 % and milk provided net returns of Rs. 3833 per farm annually. Considering in DFSCFCC Markabbinahalli, among the bovines possessed by rainfed farmers, indigenous cows formed 54% and their milk fetched net returns of Rs. 3500 per farm annually.

**Possession of livestock in MVRASK Tumkur district**

In FBFSGM Tharati, among the bovines possessed by rainfed farmers, crossbred cows formed 31 percent and their milk provided net returns of Rs. 7000 annually per farm. Among the bovines possessed by irrigated farmers, cross bred cows formed 22 % and their milk and fetched net returns of Rs. 14100 per annum. In GBFSD Belladamadugu, among the bovines possessed by rainfed farmers, crossbred cows formed 76% and the milk provided net returns of Rs. 12637 per farm annually. Among the bovines possessed by irrigated farmers, cross bred cows formed 75 % their milk and fetched net returns of Rs. 42000 per annum.

Thus in the Most vulnerable rainfed area of North Karnataka - MVRANK Bijapur district, the proportion of cross breed cows is far lower (around 50%) compared with that in Southern district (75 percent) and hence there is a greater scope for breed improvement in Bijapur district.

## 5.3 Cropping pattern

In GBFS Kappanimbargi, the farmers cultivated greater proportion of their land under sorghum (49 per cent) followed by bajra (19 per cent), grape (11 per cent) and other crops like groundnut, redgram, wheat, chickpea, sugarcane, ber and pomegranate(21%) (Table 4.3). In the case of DFSCFCC Markabbinahalli, (Table 4.4) we find the diversified cropping system such as redgram 34 per cent, bengalgram (27 %), cotton (15 per cent), sorghum (14 per cent) and other crops (wheat, sunflower and safflower).

In FBFSGM Tharati, area under Ragi accounted for 60 per cent of gross cropped area, followed by, chrysanthemum (10 per cent), arecanut (8 per cent), paddy, maize, horsegram, redgram, groundnut and jasmine (Table 4.5). In GBFSD Belladamadugu, about 51 per cent of area is allocated to groundnut followed by ragi (18 per cent) sorghum fodder (14 per cent) and other crops like paddy, maize, horsegram, redgram, chrysanthemum and Arecanut (17 %) (Table 4.6).

**Relative performance of cropping pattern in northern and southern Karnataka**

Using primary data, it is found that the farmers have a mix of subsistence and commercial crops, dominated by subsistence crops (such as ragi, groundnut in Tumkur district and sorghum and redgram in Bijapur district. Thus, the two districts are yet to be well connected with terminal markets and accordingly their economic performance is modest.

## 5.4 Dimensions of agriculture growth in Bijapur district of Karnataka

In the Most Vulnerable Rainfed Area of North Karnataka (MVRANK) Bijapur district, the dimensions of agriculture growth in Green Revolution Period (1969 to 1988) are:

Dimension 1: Market and irrigation supported farming

Dimension 2: Rainfed agriculture

In the Post Green Revolution Period (1989 to 2007) the dimensions are:

Dimension 1: Technology lead groundwater agriculture

Dimension 2: surface irrigation lead agriculture

Thus, the dynamics of agriculture growth in MVRANK Bijapur district describe a transition from technologies and markets to irrigation (Table 4.7 and 4.8). This phenomenon is due to the policy of the state in accordance with the DM Nanjundappa committee report[8] "Report of the high power committee for redressal of regional imbalances in Karnataka". The committee recommended spread of irrigation in Northern Karnataka in general which includes Bijapur.

**Dimensions of agriculture growth in Tumkur district of Karnataka**

In the Most Vulnerable Rainfed Area of South Karnataka (MVRASK) Tumkur district, the dimensions of agriculture growth in Green Revolution Period (1969 to 1988) are:

Dimension 1: Information lead agriculture

Dimension 2: Technology lead agriculture

Dimension 3: Diversified agriculture supported by groundwater

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[8]Report of the High power committee for redressal of regional imbalances in Karnataka, Planning, Programme Monitoring and Statistics Department, Government of Karnataka, 2002, pp. 23 – 27.

In the Post Green Revolution Period (1989 to 2007) the dimensions are:

Dimension 1: Groundwater supported high value crops

Dimension 2: Slow growth crops

Dimension 3: Irrigated agriculture

Thus, the dynamics of agriculture growth in MVRASK Tumkur district is described as transition from diversified low value crops to irrigated high value crops (Table 4.9 and 4.10). The per capita income in MVRASK Tumkur district has increased from Rs. 9005 to Rs. 20077 an increase of 7.2 per cent per year. In MVRANK Bijapur district the per capita income is increased from Rs. 9580 to Rs. 18386 an increase of 5.4 per cent per year (Shiddalingaswami and Raghavendra, 2010)[9]. Therefore, even though MVRANK Bijapur district received greater attention from policy makers through the DM Nanjundappa committee report, the growth rate of 5.4 per cent is below that of 7.2 per cent in MVRASK Tumkur district. This difference can be attributed to the affect of urbanization from Bangalore district to the nearby MVRASK Tumkur district. Where, due to economic opportunities from non-farming sector the growth rate are higher in MVRASK Tumkur compare to MVRANK Bijapur district.

**Dimensions of agriculture growth in northern and southern Karnataka**

In the case of MVRANK Bijapur district, we find the transition from technology and market to surface irrigation lead agriculture is due to the policy of the state in accordance with the DM Nanjundappa committee report that recommended spread of irrigation. In the case of MVRASK

[9] Shiddalingaswami H and Raghavendra VK (2010) Regional disparities in Karnataka: a district level analysis of growth and development, CMDR Monograph No. 60, Centre for Multi-Disciplinary Development Research (CMDR), Dharwad, Karnatak

Tumkur district, the farmers practiced diversified low value crops to irrigated high value crops.

## 5.5 Transitional probabilities of Land use and cropping pattern in Tumkur and Bijapur districts of Karnataka using Markov chain analysis (macro data)

### Land use pattern dynamics in MVRANK Bijapur

The probability of current fallow land has virtually reduced to zero. This is indicated that during green revolution there were several macro developmental programs such as 'Grow More Food Campaign' which facilitated farmers to cultivate even marginal and sub-marginal lands (Table 4.11). In post green revolution period, the probability of the net cropped area to be retained as net cropped area is 0.92. This shows that the pressure on cultivation gradually petered out in the post green revolution period compared to green revolution period in MVRANK Bijapur (Table 4.12).

### Land use pattern dynamics in MVRASK Tumkur

In green revolution period, the probability of transition from forest to other cultivated land was 0.96 (Table 4.13). Thus, Tumkur lost forest land. But in the post green revolution period due to forest conservation act and national forest policy, the probability of retention of forest land in forest was substantial (0.96) (Table 4.14).

### Relative performance of land use pattern in northern and southern Karnataka

In the case of MVRANK Bijapur district current fallow land has virtually reduced zero during green revolution period but in contrast to MVRANK Bijapur, the MVRASK Tumkur current fallow land has virtually reduced to zero during post green revolution period mainly because of developmental programs like grow more food campaign which facilitated farmers not to leave fallow of small and marginal land.

**Cropping pattern dynamics in MVRANK Bijapur**

In post green revolution period the probability of retention of cereals and millets, pulses and oilseeds has been lower as compared to green revolution period (Table 4.15 and 4.16). Thus, diversification holds the key for development in the post green revolution period while specialization held the key during the green revolution period.

**Crop pattern dynamics in MVRASK Tumkur**

In the green revolution period, the probability of retention of cereals and millets, pulses and oilseeds in their respective states has been 0.93 to 0.92 whilein post green revolution period, the probability of retention in cereals and millets, pulses and oilseeds in their original state has reduced to 0.64 to 0.60 because the probability of arecanut and coconut gains from cereals and millets was substantial (0.53) (Table 4.17 and 4.18).

**Relative performance of crop pattern in northern and southern Karnataka**

In both MVRANK Bijapur and MVRASK tumkur districts, due to the economic liberalization the probability of retention of cereals and millets, pulses and oil seeds in their respective states has been lower as compared to post green revolution which leads to economic security.

**Crop pattern dynamics in GBFS Kappanimbargi**

The probability of shift from the state of vegetables to pulses and oilseeds is 0.86. These are indications of shift towards low water low value crops from low water, high value crops (Table 4.19).

**Crop pattern dynamics in DFSCFCC Markabbinahalli**

There has been no major change in the crop pattern. The probability of the state of moving from sorghum, pearl millet and wheat to redgram is 1, while that of moving from the state of redgram to sorghum is 0.53 (Table 4.20). Hence, the area under redgram accounted for 34 per cent of gross cropped area in 2012-13.

**Cropping Pattern dynamics in FBFSGM Tharati**

The dynamics of crop pattern changes in Tharati are examined considering the crop pattern followed by farmers over a decade or longer. The UASB study (Lokesh, 1998[10]), recorded the crop pattern in Tharati during 1998. Matching this with the ICRISAT, VDSA, apparently, the crops grown during 2011 were orthogonal to those in 1998.

In 1998, Tharati had ample groundwater resources, as the low lying areas were surrounded by hillocks, and with good recharge, the shallow dug/open wells were providing groundwater for irrigation. With impressive groundwater resources, Tharati was the only village (in India and the world) cultivating the most water intensive crop of *Acorus calamus* (sweet flag), a medicinal rhizome, which grows in swamp for 10 to 12 months. Considering the crop pattern on farms, 46 percent of the area was irrigated, of which the major chunk of groundwater resource was for water crops such as sweet flag which occupied 56 per cent of irrigated area, followed by paddy (15 %) is presented in Table 4.21.

During 2011, the proportion of area irrigated in Tharati, increased to 65 per cent due to the advent of drip irrigation and the associated crop

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[10]Lokesh, G.B. (1998) A resource economics study of sweet flag (Acorus calamus) in Tumkur district – Karnataka, Unpublished M.Sc(Agri) Thesis, submitted to Department of Agricultural Economics, University of Agricultural Sciences, Bangalore.

patterns. However, the area under the most water intensive crop – sweet flag, virtually reduced to zero. Thus, the Tharati crop pattern had a *volte face* treatment, with the water intensive sweet flag almost replaced by low water flower crops such as chrysanthemum and buttons. The major factors responsible for the predicament are (1) illegal sand mining which began during 2000 and is continuing unabated and (2) deforestation of hillocks. One of the reasons for excellent recharge of groundwater in dug wells during 1998, was the sumptuous sand layer which held the rain water and later percolated as groundwater in dug wells. However, due to illegal sand mining, the groundwater holding capacity of aquifer reduced gradually. The denudation of forests in surrounding hillocks exacerbated the predicament. Currently, Tharati is in the conundrum of groundwater scarcity due to both manmade and climate change effects. This is further reflected in the performance of irrigation wells. During 2011, with 190 wells, 50 percent were borewells and the rest, open wells. Among the borewells, only 50% were functioning, while among dug wells only 9 percent were functioning. This shows the rapid fall in the groundwater potential as reflected in the high rate of well failure of 91% in the case of open/dug wells and 50 per cent in the case of borewells. Accordingly, this fall in the groundwater endowment and the corresponding change in the crop pattern by the farmers in an attempt to remain on the original isorevenue curve, have resulted in coping mechanisms such as drip irrigation and choice of low water high value crops such as chrysanthemum, buttons, virtually abandoning the Acorus calamus.

Unless the illegal sand mining activity is checked in Tharati, farmers continue to face the predicament of acute water scarcity. With the rapid reduction in the area under sweet flag (*Acorus calamus*), the market price of Acorus calamus which was Rs. 2700 per quintal during 1998 has shot up to a whopping Rs. 23000 per quintal in 2013. The transitional probability analysis (or Markov chain analysis) indicated in Table 4.22

has corroborative evidence of this phenomenon of shift in crop pattern in Tharati.

**Crop pattern dynamics in GBFSD Belladamadagu**

As this village is dominant for groundnut crops, the transitional probability matrix has predicted the probability of shift in the state of cereals and millets to pulses and oilseeds as 1.00. Similarly, shift in the state of pulses and an oil seed to cereals and millets is 0.36 (Table 4.23). Hence, the farmers were growing groundnut as commercial crop in GBFSD Belladamadugu.

**Relative performance of cropping pattern in study villages of MVRANK Bijapur and MVRASK Tumkur district**

Thus in MVRANK Bijapur, the probability of shift from sorghum and bajra to redgram is substantial and in the case of MVRASK Tumkur, the probability of moving from sweet flag (*Acorus calamus)* to chrysanthemum is substantial and groundnut crop retained to its original state is substantial.

## 5.7 Sources of information and supply of new technology inputs and the markets for different crops

Farmers receive agriculture information from different sources like word of mouth, progressive farmers, *state raitha sampar kakendra*, mobile phone and input dealers (Table 4.24). In the study villages, highest numbers of sample respondents were accessing agricultural information from word of mouth and progressive farmers. This finding of the study is supported by Adhiguru *et al.* 2009.

**Adoption of improved and traditional varieties by sample farmers**

In GBFS Kappanimbargi, about 75 per cent of traditional variety of bajra is cultivated but in contrast to bajra about 73 per cent (Table 4.25) of improved variety of sorghum was cultivated by the farmers. In DFSCFCC Markabbinahalli, here almost all farmers are using improved varieties for different crops. Hence, this village is exposed to diversified agriculture and different sources of information (Table 4.26).

In FBFSGM Tharati, (Table 4.27) all the sample farmers are using improved variety of paddy, maize, horsegram, redgram, and groundnut. Traditional varieties of ragi were used by rainfed farmers (31 per cent) and farmers with irrigation facility (20 per cent) but farmers buying irrigation water cultivated improved varieties of ragi and which indicates that farmers sought information from various sources. In GBFSD Belladamadugu, only 11 per cent traditional variety of groundnut was used by the farmers whereas in other crops, (Table 4.28) the farmers are using improved varieties.

The major markets of farmers (Table 4.31 and 4.32) in MVRASK Tumkur district: are Tumkur APMC, KR market Bangalore and Madhugiri APMC for different crops while in MVRANK Bijapur, the major markets for farmers are Bijapur APMC, Devarahippargi shandy and horti shandy for different crops (Table 4.29 and 4.30).

### 5.8 Marketable surplus of sample farmers

In MVRANK Bijapur, the marketable surplus was low in the case of Sorghum and Bajra crop because they are cultivated every year as they are staple food crop of this region(Table 4.33 and 4.34). Correspondingly in MVRASK Tumkur, the marketable surplus was low in the case of ragi because it is cultivated every year as it is the staple food crop of this region (Table 4.35 and 36).

**Costs and return structure of VDSA farmers in Karnataka**

In GBFS Kappanimbargi, the crop income of small farmers was reduced during 2011 as compared to 2009 (Table 4.37, 4.38 and 4.39), it is mainly due to drought occurrence in the village. The large farmers received higher income per acre by growing high value crops like grapes and the labours are also getting more income due to migration. In DFSCFCC Markabbinahalli, the income level of farmers was fluctuated due to uneven occurrence and distribution of rainfall. In FBFSGM Tharati, the income level of large farmers from crop was decreased during 2011 as compared to 2009, it is mainly due to acute shortage of groundwater which was triggered by sand mining in the village. In GBFSD Belladamadugu, for small farmers the income from livestock was increased during 2011 as compared to 2009 because in this village dairy is the major income generating enterprise.

## 5.9 Costs and return structure of sample farmers

The sample farmers in the study area try to minimize the production risk by spreading the risk to various enterprises instead of one activity. In GBFS Kappanimbargi, the net income was higher in the case of farmers with irrigation facility and it is mainly because of the farmers are growing high value horticulture crops like Grapes (Table 4.40). In DFSCFCC Markabbinahalli, about 31 per cent of the income is received from crop enterprise, 67 per cent from off-farm employment and only 2 per cent from the livestock enterprise by the farmers.

In FBFSGM Tharati, the net return was the highest in the case of farmers with irrigation facility mainly because most of the farmers cultivated high value crops like chrysanthemum. In GBFSD Belladamadugu, dairy is one of the important (Table 4.41) components in all enterprises. Hence, the farmers with irrigation facility are getting the highest net income from dairy which formed about 41 per cent of the total net income.

Thus the MVRANK Bijapur district is influenced by Dr DM Nanjundappa committee report and the MVRASK Tumkur district is influenced by Bangalore urbanization.

### 5.10 Relative economic performance of the most vulnerable rainfed areas in Northern and Southern Karnataka (Rs.)

For farmers cultivating high value crop such as grapes in MVRANK Bijapur, the PCI (per capita income) is 61% higher than farmers cultivating largely food and subsistence crops. This on per acre basis, fetches 58% higher gross income compared with farmers cultivating largely food crops (Table 4.43).

For farmers cultivating high value crop such as flowers in MVRASK Tumkur district, the per capita income is 90% higher than farmers cultivating largely food and subsistence crops. This on per acre basis, fetches 86% higher gross income compared with farmers cultivating largely food crops.

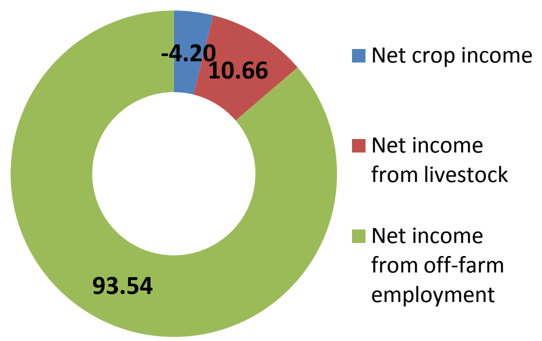


**Fig 5.1: Net income (Rs. 7957) received by rainfed farmers in Kappanimbargi (on per acre basis)**

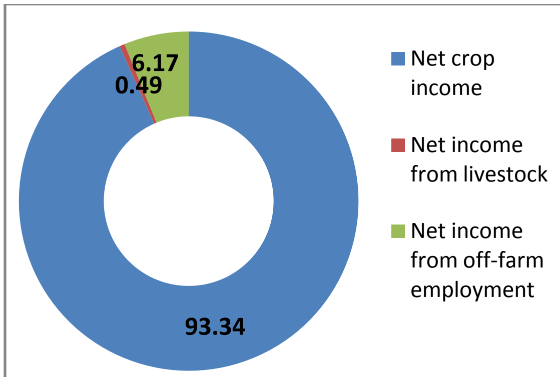


**Fig 5.2: Net income (Rs. 81619) received by irrigated farmers in Kappanimbargi (on per acre basis)**

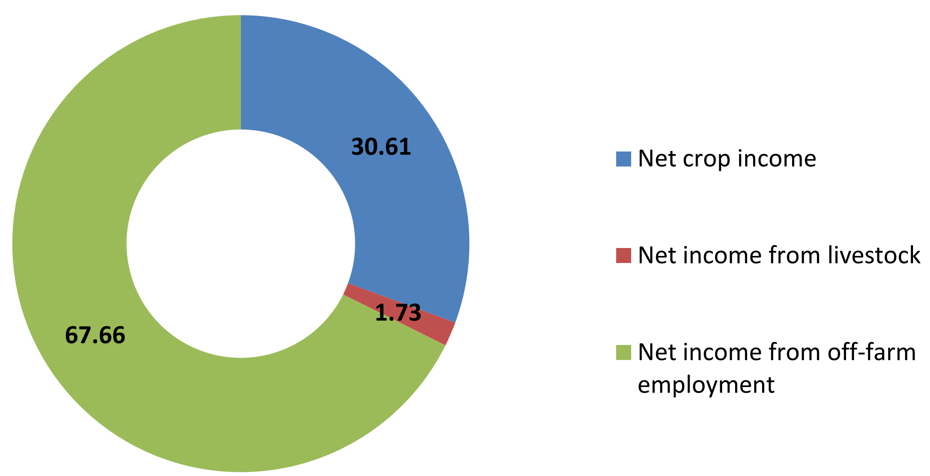


**Fig 5.3: Net income (Rs. 13653) received by rainfed farmers in PCC Markabbinahalli (on per acre basis)**

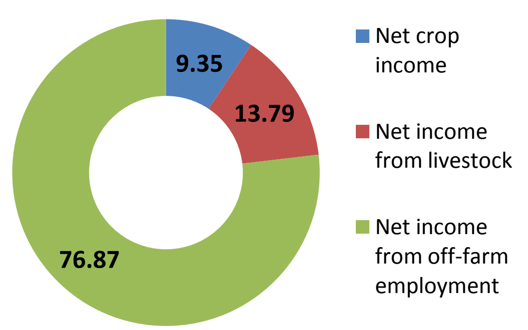


**Fig 5.4:Net income (Rs. 32944 received by rainfed farmers in GCF Tharati (on per acre basis)**

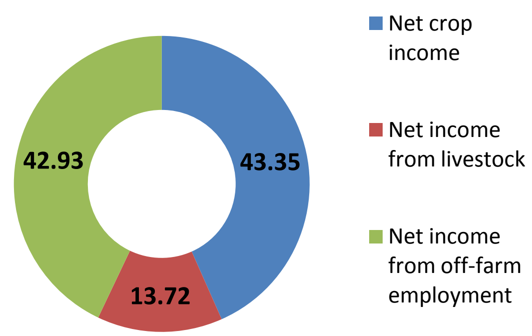


**Fig 5.5: Net income (Rs. 48544) received by irrigated farmers in GCF Tharati (on per acre basis)**

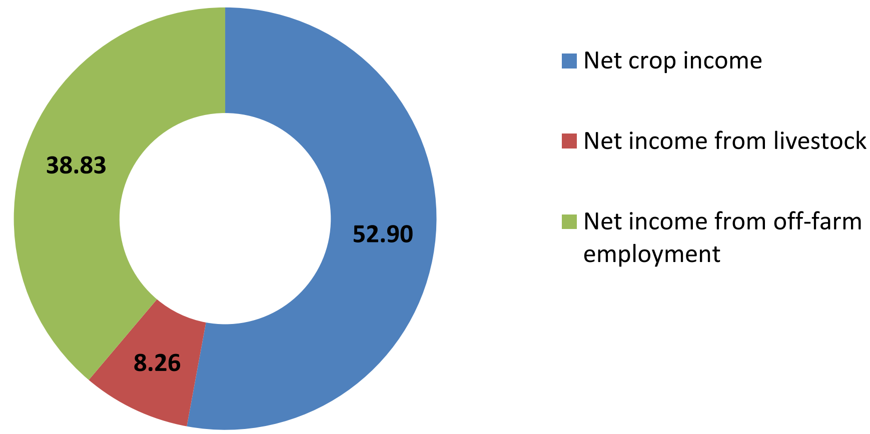


**Fig 5.6: Net income (Rs. 18592) received by water buyers in GCF Tharati (on per acre basis)**

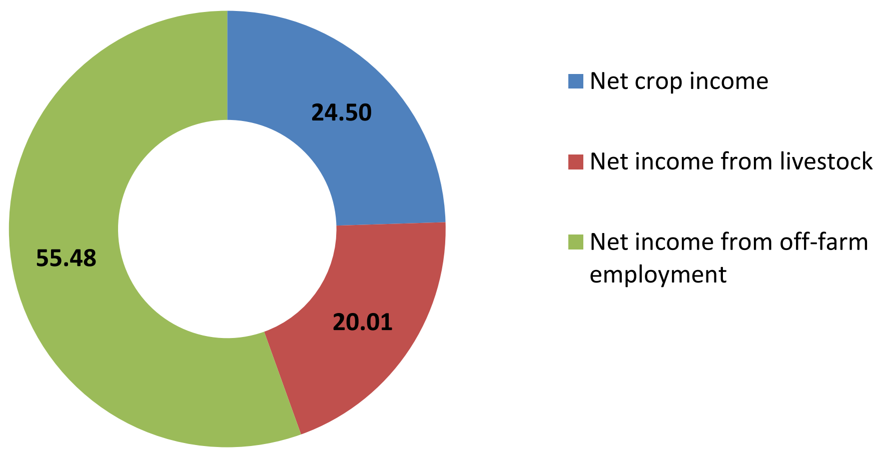


**Fig 5.7: Net income (Rs. 17982) received by rainfed farmers in PCD Belladamadugu (on per acre basis)**

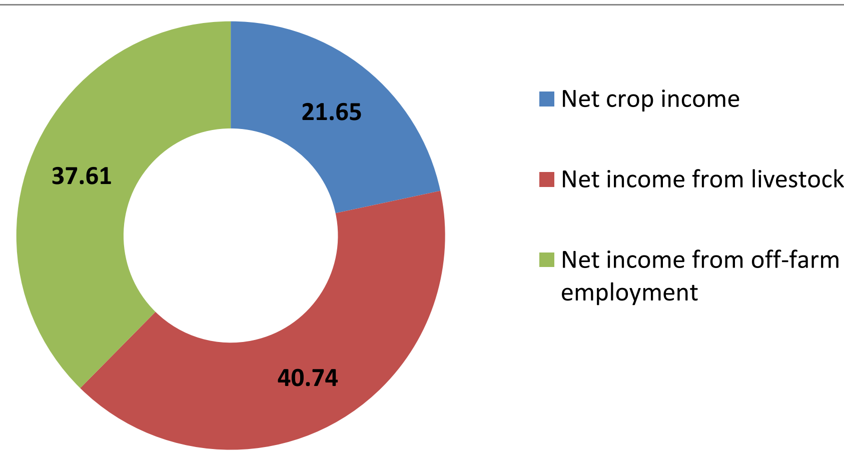


**Fig 5.8: Net income (Rs. 12803) received by irrigated farmers in PCD Belladamadugu (on per acre basis)**

## Relative performance of districts in northern and southern Karnataka

For farmers cultivating high value crop such as grapes in MVRANK Bijapur, the PCI (per capita income) is 25% higher than farmers cultivating flower crops in MVRASK Tumkur district. For farmers cultivating grapes in MVRANK Bijapur their gross income per acre is 49% lower than that received by farmers cultivating flower crops in MVRASK Tumkur district.

Considering farmers cultivating food and other subsistence crops in MVRANK Bijapur, their PCI is 47% higher than their counterparts in MVRASK Tumkur district. The gross income per acre for farmers cultivating food crops and subsistence crops in MVRANK Bijapur, is 40% lower than the gross income received by their counterparts in MVRASK Tumkur district.

## Regional Imbalance addressed

The Report of the Committee on Regional Imbalance in Karnataka headed by Dr DM Nanjudappa recommended various developmental programs for reduction of regional imbalance in North Karnataka. Accordingly, the successive Governments developed rural development programs and followed the recommendations since 2007-08. Therefore the economic performance of the MVRANK Bijapur district is better than the MVRASK Tumkur district in providing higher per capita income. However, on per acre basis, still Bijapur district lies below Tumkur district. This is because the size of holdings in Bijapur is around 6 to 7 acres, while that in Tumkur district are 2-3 acres.

## 5.11 Transaction cost and benefits of sample farmers from development programs in MVRANK Bijapur

In GBFS Kappanimbargi, among different development programs, the largest popular development program was BPL ration card, around 80 per cent of sample farmers are availing benefit. Each household availed an annual benefit of Rs. 5067 by incurring one time transaction cost of Rs. 311 (Table 4.44). Next popular programme was loan waive program with 61 per cent of sample households benefited and per household benefit was Rs. 2783 by incurring one time transaction cost of Rs. 295. Third most popular programme was Midday meal scheme with 57 per cent of sample households benefited and each household received benefit of Rs. 2824 for 300 school days. Regarding all other programmes, the proportion of beneficiaries are below 10 per cent except for APL ration card, school uniform, school books and bag, *Kaliyuva makkalige cycle* and suvarna bhumi yojane.

In DFSCFCC Markabbinahalli, about 93 per cent of the sample households received the benefit from BPL card which is the largest popular programme offering food security for the sample farmers. Each household availed an annual benefit of Rs. 5295 by incurring one time transaction cost of Rs. 260. Next popular programme was midday meal program with 53 per cent of sample households benefited and per household benefit was Rs. 4219 (Table 4.45). The third most popular programme was drought prone area program with 30 per cent of sample households benefited.

**Transaction cost and benefits of sample farmers from development programs in MVRASK Tumkur**

In FBFSGM Tharati, About 73 per cent of the households received the benefit from BPL card which is largest popular programme offering food security for the sample farmers (Table 4.46). Each household gets an annual benefit of Rs. 5134 by incurring one time transaction cost of Rs. 239. Hence, the role of ration card is to provide food security, preventing begging for food and builds self respect / self esteem.

The next popular programme is Midday meal scheme with 50 per cent of sample households benefited and each household got a benefit of Rs. 2700 for 300 days. About 43 per cent of sample households benefited from school uniform and school books and bag programmes. The household opined that, the educational scheme enabled them in getting nutritious food for children, reducing malnutrition, scholarship for physically handicapped student, school uniform for discipline, identity, reduces travel drudgery and educational purposes. In the rest of the development programmes the proportion of beneficiaries are below 10 per cent except for APL ration card, *Kaliyuva makkalige cycle*, Indira Gandhi National widow pension and subsidy for gutter sprayer.

In GBFSD Belladamadagu, About 87 per cent of the sample households received the benefit from BPL card which is the largest popular programme offering food security for the sample farmers. Each household availed an annual benefit of Rs. 5262 by incurring one time transaction cost of Rs. 200 (Table 4.47). Next popular programme was drought prone area program with 30.33 per cent of sample households benefited. The third most popular programme was Midday meal scheme with 30 per cent of sample households benefited and each household received a benefit of Rs. 3167 for 300 days. Regarding all other programmes, the proportion of beneficiaries are below 10 per cent, except for school uniform, school books and bag, *Kaliyuva makkalige cycle*, Indira Gandhi National old age pension and loan waive.

**Total benefits accrued to households from developmental programs**

In FBFSGM Tharati, the farmers with irrigation facility are benefiting more from developmental programs of Rs. 10257 by incurring one time transaction cost of Rs. 426 compared to farmers buying irrigation water(Rs. 5540 by incurring one time transaction cost of Rs. 300) and rainfed farmers (Rs. 6836 by incurring one time transaction cost of Rs. 277). It indicates that subsidies for gutter sprayers, farm machinery and National Horticulture Mission (NHM) are the most popular program of the Agricultural Department and Horticultural Department in the case of irrigated farmers, 50 per cent of the farmers getting benefit. Regarding all other villages, rainfed farmers are benefiting (Rs. 9196 by incurring one time transaction cost of Rs. 393) (Table 4.48 and 4.49) more from development programs compared to farmers with irrigation facility (Rs. 6731 by incurring one time transaction cost of Rs. 402). It is hypothesized that rainfed farmers benefiting more from developmental programs compared to irrigated farmers. That, around 87 per cent of the sample farmers had ration card, in itself is a *prima-face* indicator of receiving at least the basic supply of food. Therefore, the food security is taken care by the Government.

Thus the developmental programs in MVRANK Bijapur district are providing higher benefit of 15 % (Rs. 9170) per family than that of Rs. 7982 received per family in MVRASK Tumkur district.

## 5.12 Water market

Water market is influenced by both demand and supply induced factors. Water markets for groundwater have emerged in FBFSGM Tharati because of surplus water from wells in relation to their irrigated area and land holding per head is modest in Tharati village. The markets for groundwater have emerged where well owners have surplus water and high demand for irrigation water in Gujarat (Kollavalli and Chicoine, 1989).

The average land holding size of farmers buying irrigation water is 1.49 acres of which 36 per cent of land is irrigated by buying groundwater and remaining area (64%) (Table 4.50) was cultivated under rainfed conditions. The average land holding size of farmers selling irrigation water is 1.74 acres of which 57 per cent of land is irrigated using own irrigation groundwater and remaining area (43%) is under rainfed condition.

**Cropping Pattern of water buyers and water sellers in FBFSGM Tharati**

The cropping pattern of farmers buying irrigation water, is : 52 per cent area is under ragi, chrysanthemum (35 per cent), paddy (2%) and other crops like horsegram, jasmine and arecanut while the farmers selling irrigation water cultivated about 58 per cent of the area under chrysanthemum, ragi (18 per cent), paddy (14 per cent) and arecanut (10 per cent) But, in early 1998 the farmers were cultivating *Acorus calamus* (sweet flag) in stagnant water for 10 months as they had sumptuous groundwater. In recent years in post 2000, due to sand mining activity in Tharati, there has been acute shortage of ground water and the farmers shifted from Acorus calamus to low water high value flower and Arecanut crops.

The major difference in cropping pattern is that well owners devoted greater proportion of their land to the cultivation of chrysanthemum flower crop (58 %) and other food crops. In the case of farmers buying irrigation water, the greater proportion of their land was to the cultivation of Ragi (52 %) and next was chrysanthemum flower crop (35 %) and other crops in FBFSGM Tharati (Table 4.51).

About 55 per cent of farmers buying groundwater bought groundwater from their neighboring non-relatives (Table 4.52). In the case of groundwater sellers, about 70 per cent of farmers are selling groundwater to their neighboring non-relatives.

**Economics of cultivation of Chrysanthemum on 1/4$^{th}$ acre (10 guntas) by groundwater buyers and sellers in FBFSGM Tharati, 2013**

In the case of groundwater seller, the usage of fertilizers, FYM, number of hours per irrigation and manpower is higher compared to farmers buying irrigation water due to high investment capacity, entrepreneurship abilities and risk bearing capacity. The study found that groundwater sellers realized (Table 4.53) higher net returns of Rs. 46883 higher by 48 per cent compared to the farmers buying irrigation water for chrysanthemum cultivation (Rs.31620) because groundwater buyer has to pay 1/3$^{rd}$ of produce income to groundwater seller.

**Distribution of land ownership and average land holdings by farm size group in VDSA villages in Karnataka**

The composition of area under dryland and irrigated is same across the different categories of farmers (Table 4.54). Over the years area under large farmers and medium farmers was increased as compared to the small and labourers. In the case of labor the land under consideration was leased in land. The average holding size was not much variation across different categories of farmers over the years of 2009 to 2011(Table 4.55).

The area under irrigation is more in the case of large and medium farmers while it was low in the case of small farmers and labour (Table 4.56). In the case labour, the cultivation of the leased in land with irrigation facility was 1.21 ha during 2010 which was more as compared to 2009 and 2011 but in case of large farmers, the area under irrigation was shown the increasing trend over years of 2009 to 2011 because the large farmers are having the investment capacity and risk taking ability.

The area under irrigation was ranges between 20% to 40% across the different categories of farmers in that the small and labour groups have the highest proportion of area under irrigation (40%) compare to large and medium farmers (20%) because the average land holding capacity of large farmers was high as compared to small and labour (Table 4.57).

**Total asset value per household by farm size in VDSA villages of Karnataka**

The land value of large farmers was highest as compared to others because most of the large farmers are having irrigated land and they are growing horticultural crops like grapes. Hence, the land value was more. The total livestock value was decreasing in the case of small and labour (Table 4.58) it is mainly due to acute shortage of water. Total value for durables was less in the case of small farmers as compared to labour and others because they are dependent on crop income. Farm equipment, total asset value and average asset value per hectare of farm was highest in large farmers because their capital investment was high and their income is also more.

The land value for large farmers was high as compared to other farmers it is mainly due to the size of land holding was high in the case of large farmers and also they are having more number livestock. Hence, the value for livestock was more (Table 4.59). The total value for equipment was less in the case of small farmers because their land holding was less and the total area was under rainfed condition. The total asset value and average asset value per hectare was high in the case of large farmers because they are investing capital for land for different activities like soil conservation and soil bunding across the field.

In FBFSGM Tharati, value of land for small farmers was more during 2011 as compared to 2009 and which is mainly because of land is accessible road as compared to other farmers group. The value livestock was less in the case labour groups it is mainly due to average number bovine animals are less and small ruminants are more. Hence, the value of livestock was less (Table 4.60). Total value of resident house, total value of stock inventory, value of durables, farm equipment, total asset value and average asset value per hectare of farm was more in the case of large farmers it is mainly due to large farmers are having irrigation facility and they are cultivated floriculture as major crop. Hence, they are having capital investment capacity and they are ready to take risk and compared to other farmers group.

The value of land in GBFSD Belladamadagu was not having much variation between the period of 2009 to 2011 it is mainly due to village is surrounded by hillocks and access of road is not good (Table 4.61). The value of livestock was less in the case of labours because they are raring small ruminants. The value of durables was less in the case of large farmers because they are getting additional income from dairy and also for consumption and in this village livestock will act as ATM (means Any Time Money). Total asset value and average asset value per hectare was more in the case farmers because most of the large farmers are irrigated farmers.

**Average wage rate in VDSA villages in Karnataka**

It is evident from the results presented in the Table 4.62 that, the wage rate of the man worker is higher than the woman worker in both farm and non-farm activity. The wage rate of majority of the worker has shown increasing trend over the years of 2009 to 2011. The wage rate of bullock pair with operator has shown significant increasing trend because of decreasing number of bullock and increasing maintenance cost of bullocks.

It is envisaged from the results presented in the table 4.63 that, the wage rate of the man worker is higher than the woman worker in both farm and non-farm activities. The average wage rate of man worker was Rs.171 and Rs.225 for farm and non-farm work respectively during 2009 to 2011. The wage rate of man for farm work has been increased to the extent of 33 percent and to 90 percent for woman.

It was evident from the results presented in the table 4.64 that, wage rate of the man worker is higher than the woman worker in both farm and non-farm case. The wage rate for farm work increased to the extent of 18 per cent and 90 percent for man and woman respectively during 2009 to 2011. The wage rate of majority of the worker has shown increasing trend over the years. The bullock pair with operator has not been put for the non-farm work.

It is observed from the Table 4.65 that wage rate of the man worker is higher than the woman worker in both farm and non-farm case i.e., it was almost thrice of the woman worker wage rate. The wage rate of man for non-farm work has been increased to the extent of 25 per cent i.e., from Rs.199 to Rs.254. The wage rate of harvester cum thresher has shown significant increasing trend i.e., from Rs.400 to700.

**Rainfall distribution pattern in VDSA villages of Karnataka**

The results presented in the Table 4.66 revealed that, the total rainfall received during the year 2009 was less in MVRANK Bijapur district as it was drought year. DFSCFCC Markabbinahalli village is receiving good rainfall as compared to GBFS Kappanimbargi village during 2010 and 2011. The results presented in the Table 4.67 revealed that the average monthly rainfall was higher in the FBFSGM Tharati village as compared to the Belladamadugu. The average rainfall received during *kharif* season was higher than the *rabi* and *summer* season.

**Source of information received by the different group of farmers in VDSA villages of Karnataka**

The major source of technical and non-technical information obtained were Input dealers, farmers, Government organization, mass media and research station as the frequency of contact was high with input dealers and neighbor farmers. (Table 4.68, 4.69, 4.70 and 4.71) In recent years, increasing in the extension activity from both Government departments and research stations are helping the farmers to get more information for the agriculture activity in all the VDSA villages of Karnataka.

The major source of technical and non-technical information obtained were Input dealers, farmers, Government organization, Mass media and research station as the frequency of contact is high with input dealers and neighboring farmers (Table 4.69). In recent years there was increasing in the extension activity from both government departments and research stations helping the farmers to get more information for the agriculture activity. In FBFSGM Tharati and GBFSD Belladamadugu, the major source of horticultural crops is Government organization because of introduction of National Horticulture Mission (NHM).

**Households borrowings and lendings by farm size in VDSA villages of Karnataka**

Interestingly large farmers and small farmers are not depending upon self help groups likewise medium farmers are not depending upon finance companies and labourers are not depending upon cooperatives for the borrowings (Table 4.72). The total borrowings shows increasing trend for small farmers and labourers from 2009 to 2011. Interestingly large farmers and small farmers are not depending upon finance companies and self help groups likewise medium farmers are not depending upon self help groups and labourers are not depending upon cooperatives for the borrowings. Labourers did not borrow from the formal type in the year 209 instead they entirely depended upon informal type (Table 4.73). The grand total of borrowings by the large farmers is showing the decreasing trend as an overall.

Interestingly large, (Table 4.74) medium and small farmers are not depending upon finance companies. Likewise labourers are not depending upon cooperatives and finance companies for the borrowings. Labourers did not borrow from the formal type in the year 209 instead they entirely depended upon informal type because of procedural complexity. Medium and small farmers are not depending upon commercial banks and finance companies for borrowings (Table 4.75). Likewise labourers are not depending upon finance companies for the borrowings because the most of the farmers are participating in self help groups (SHGs).

**Average annual expenditure of food and non-food in VDSA villages of Karnataka**

In MVRANK Bijapur district, the average value of food expenditure per household forms almost 50 percent (Table 4.76 and 4.77) of the total expenditure in the case of all the category of farmers except large framers (<40%) and it is paradox that the average value of food and non food expenditure is higher in case of landless laborers than small farmers.

In GBFSD Belladamadagu, the average value of food expenditure per household forms almost 50 percent of the total expenditure in the case of all the category of farmers except large framers (<43). The growth rate in the food expenditure over the years is around 13 % across different category of the farmers except large farmers which is about -10 per cent and in the case of non-food expenditure is about 24 % across different category of the farmers except large farmers which is about 33 per cent (Table 4.78).

In FBFSGM Tharati, the average value of food expenditure per household forms almost 45 percent of the total expenditure (Table 4.79) in the case of all the category of farmers except large framers (<40). The growth rate in the food expenditure over the years is around -6.35 % across different category of the farmers except large farmers which is about -11.18 per cent and in the case of non-food expenditure is about 43 % across different category of the farmers except large farmers which is about -30 per cent.

**Household level summary in VDSA villages of Karnataka**

The (Table 4.80) average value of food expenditure per household forms almost 47 per cent of the total expenditure in the case of all the category of farmers except large framers (<38.), The growth rate in the food expenditure over the years is around 122 % across different category of the farmers except large farmers which is about 109 per cent and in the case of non-food expenditure is about 144 % across different category of the farmers except large farmers which is about 139 per cent.

The growth rate in the food expenditure over the years is around 144 % across different category of the farmers except large farmers which is about 142 per cent and in the case of non-food expenditure is about 112 % across different category of the farmers except large farmers which is about 106 per cent (Table 4.81). The average value of food expenditure per household forms almost 48 percent of the total expenditure in the case of all the category of farmers except large framers (<40).

The average value of food expenditure per household forms almost 44 percent (Table 4.82) of the total expenditure in the case of all the category of farmers except large framers (<40). The growth rate in the food expenditure over the years is around 98 % across different category of the farmers except large farmers which is about 96 per cent and in the case of non-food expenditure is about 104 % across different category of the farmers except large farmers which is about 83 per cent.

The average value of food expenditure per household forms almost 48 percent of the total expenditure in the case of all the category of farmers except large framers (<44). The growth rate in the food expenditure over the years is around 110 % across different category of the farmers except large farmers which is about 116 per cent and in the case of non-food expenditure is about 43 % across different category of the farmers except large farmers which is about -30 per cent(Table 4.83).

**Average amount of benefits received by the beneficiary households from Government welfare programs in VDSA villages of Karnataka**

In GBFS Kappanimbargi, among different development programs during 2009 to 2011, the largest popular development program was Public Distribution System, around 38 households are availing benefit. Each household availed an annual benefit of Rs. 795 (Table 4.84). Next popular programme was free education trip by ICRISAT with 34 households were benefited and per household benefit was Rs. 2044 during 2010. Third most popular programme was drought relief with 27 households benefited and each household received benefit of Rs. 6300 in 2009. Regarding all other programmes, the beneficiaries are below 10 except for bhagya jyothi, agricultural input subsidy, mid day meal scheme, anganwadi, pensions.

In DFSCFCC Markabbinahalli, among different development programs during 2009 to 2011, the largest popular development program was Public Distribution System, around 40 households are availing benefit. Each household availed an annual benefit of Rs. 1488 (Table 4.85). Next popular programme was mid day meal scheme with 26 households were benefited and per household benefit was Rs. 1870 in 2011. Third most popular programme was pension (old age, widow, etc.) with 15 households benefited and each household received benefit of Rs. 4667 in 2010. Regarding all other programmes, the beneficiaries are below 10 except for drought/flood relief and anganwadi.

In FBFSGM Tharati, among different development programs during 2009 to 2011, the largest popular development program was Public Distribution System, around 39 households are availing benefit. Each household availed an annual benefit of Rs. 3361 (Table 4.86). Next popular programme was midday meal scheme benefited (24) households and per household benefit was Rs. 2044 during 2010. Third most popular programme was bhagya jyothi (15) and each household received benefit of Rs. 2000 in 2009. Regarding all other programmes, the beneficiaries are below 10 except for subsidy on education.

In GBFSD Belladamadagu, among different development programs during 2009 to 2011, the largest popular development program was Public Distribution System, around 40 households are availing benefit in 2011. Each household availed an annual benefit of Rs. 3603 (Table 4.86). Next popular programme was midday meal scheme benefited (20) households and per household benefit was Rs. 2923 during 2010. Third most popular programme was women self help group (14) and each household received benefit of Rs.9429 in 2009. Regarding all other programmes, the beneficiaries are below 10 except for subsidy on education.

# SUMMARY AND CONCLUSION

# CHAPTER VI
# SUMMARY AND CONCLUSION

The National Rainfed Authority of India (NRAI) identified around 500 vulnerable districts along the length and breadth of the nation, based onNatural Resource Index (NRI), Integrated Livelihood Index (ILI), Milk Production Potential (MPP) and Rainfed Area Prioritization Index (RAPI) score and prioritized them. The top one-third districts (167) are high priority rainfed districts, and the <u>first 50 districts are identified to receive immediate focus for agricultural growth</u>.

For this study on the economic analysis of agricultural transformation process in Karnataka, in the top 50 districts identified by the NRAI to receive immediate focus, Tumkur and Bijapur districts, with an all India ranking of the 25$^{th}$ and the 26$^{th}$considering the above indices of vulnerability are respectively in the southern and northern Karnataka. This study isundertaken in the Most Vulnerable Rainfed Area in North Karnataka (MVRANK) -Bijapur district and the Most VulnerableRainfed Area in South Karnataka (MVRASK)- Tumkur district, to analyethe agricultural transformation between the Green Revolution (1969-1988) and the post Green Revolution (1989-2007) periods.

The agricultural transformation is hypothesized to be unique in each of the two districts and it is in order to analyze the transition and process of transformation, using around four decades of secondary data and 150 farmers for primary data. The secondary data from VDSA (Village Dynamics Study in South Asia from ICRISAT) are drawn for the two periods of Green Revolution (1969-1988) and post green revolution (1989-2007). The emphasis during green revolution was to provide food security and in the post green revolution was towards livelihood security. The specific objectives of the study are:

1. To assess agricultural transformation and analyze the factors contributing such as crop pattern, enterprise combinations, technology, markets, institutions and analyze agricultural transformation process for inclusive growth.
2. To analyze the sources of information and supply of new technology inputs and to estimate marketable surplus and the markets for output in different crops.
3. To estimate impact of Government policies and programs on poverty and development pathways.
4. To estimate how access to irrigation through water markets enhances the livelihood security of the rainfed farmers.

### 6.1 Sampling framework

#### District typologies

For this study field data were collected from two districts of Karnataka being categorized based on rainfall vulnerability[11] as the Most Vulnerable Rainfed Area in North Karnataka (MVRANK) (Bijapur district) and the Most Vulnerable Rainfed Area in Southern Karnataka (MVRASK) (Tumkur district). The sampled villages are the VDSA villages of Kappanimbargi, Markabbinahalli in MVRANK (Bijapur district) and Belladamadugu and Tharati villages in MVRASK (Tumkur district) for field data collection. In each village 30 sample farmers were chosen for primary data collection during Jan – Feb 2013 for the data pertaining to 2012 crop year. In addition, in Tharati, as the groundwater has depleted far beyond imagination due to sand mining activity, and to analyze the contribution of water markets to the economy of water buyers, field data from 20 farmers buying irrigation water and 10 farmers selling irrigation water were obtained during Jan – Feb 2013 pertaining to 2012 crop year.

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[11] http://nraa.gov.in/ browsed on 17/02/ 2012.

**Village typologies**

The village types were categorized based on magnitude of proportion of area cultivated by sample farmers by different crop types and the income security.

In Kappanimbargi village, MVRANK Bijapur district, sample farmers have 49% of area under sorghum followed by bajra (19 %), grape (11 %). Here grapes contributed substantially to income and hence the village is categorized as 'Grapes Based Farming System (GBFS) Kappanimbargi'.

In Markabbinahalli village, MVRANK'S Bijapur district, farmers cultivate redgram in 34 % of the area, followed by bengalgram (27 %), cotton (15 %) and they are deriving a major portion of income from cotton. Hence, this village is categorized as 'Diversified Farming System with a Combination of Food and Commercial Crops (DFSCFCC) Markabbinahalli'.

In Tharati village, MVRASK's Tumkur district, 60 % of the area was under ragi followed by chrysanthemum flower crop10 %. Hence, this village is categorized as 'Grain Crop with Floriculture (FBFSGM) Tharati'.

In Belladamadugu village, MVRASK's Tumkur district, 51 % of the area is allocated to groundnut followed by ragi (18 %) with the major portion of income from milch cows. Hence, this village is categorized as 'Oilseed Crop with Diary (GBFSD) Belladamadugu'.

The VDSA data from ICRSIAT were used to analyze the agricultural transformation process at macro level in the two districts for the two time periods 1969-1988(Green Revolution) and 1989-2007 (Post Green Revolution).In addition, secondary data (which is the primary data obtained at village level by VDSA) for 2009-11 have been used from the

Village Dynamics in South Asia (VDSA) project of ICRISAT for ground truth regarding crop pattern shifts if any. For Tharati village, the results of the study from Lokesh(1998) conducted to analyze the economics of sweet flag (Baje) crop have been used.

## 6.2 Analytical tools used

The results for the two districts MVRANK and MVRASK considered for the study Bijapur, Tumkur districts are compared with regard to the cropping pattern, enterprise combination, technology (High Yielding Varieties), markets and its related infrastructural facilities. Comparison was also made for the two time periods - Green Revolution (1969 to 1988) and Post Green Revolution (1989 to 2007).

Factor analysis

Factor Analysis was used to reflect the agricultural transformation through dimensions. FA is a multivariate technique that attempts to account for the co-relational pattern in a set of observed random variables in terms of a minimal number of unobservable or latent variables called Factors (Dimensions). Factor loading: refers to magnitude of association of each variable with the dimension. As the orthogonal rotation is chosen for extraction of dimension in factor analysis then the dimensions are independent and variables within the dimensions are interdependent.

Markov Chain Analysis

The transition in agricultural transformation was assessed by estimating the transitional probabilities in land use at district level and in crop pattern at village level using the Markov chain analysis. The transitional probability matrix describes the probability of movement from one state to the other over time. The off diagonal element $P_{ij}(i \neq j)$,indicates the probability of the $i^{th}$state moving to the $j^{th}$ state. While, the diagonal element $P_{ij}$, $(i=j)$, indicates the probability of retaining in the current state.

The tabular and percentage analysis were used to explain the results of the sources of information and supply of new technology inputs and the markets for output in different crops. Marketable surplus and costs were estimated to study the economics of crops and enterprises of sample farmers. The transaction cost and benefits of farmers from development programs were estimated.

### 6.3 Major findings

- In Grapes Based Farming System(GBFS) Kappanimbargi village, the farmers devoted greater proportion of their land under sorghum (49 %) followed by bajra (19 %), grape (11 %) and other crops like groundnut, redgram, wheat, chickpea, sugarcane, ber and pomegranate(21 %).
- In Diversified Farming System with a Combination of Food and Commercial Crops (DFSCFCC) Markabbinahalli village,majority of the farmers cultivated redgram (34 % of the area), followed by, bengalgram (27 %), cotton (15 %), sorghum (14 %) and other crops (wheat, sunflower and safflower).
- In Floriculture Based Farming System with Groundwater Markets (FBFSGM) Tharati village, majority of the farmers cultivated ragi (60 % of the area), followed by, chrysanthemum (10 %), arecanut (8 %), paddy, maize, horsegram, redgram, groundnut and jasmine (22 %).
- In Groundnut Based Farming System with Dairy as Main Enterprise (GBFSD) Belladamadugu village, about 51 % of area was allocated to groundnut followed by ragi (18 %), sorghum fodder (14 %) and other crops like paddy, maize, horsegram, redgram, chrysanthemum and arecanut (17 %).

Using primary data, it was found that the farmers have a mix of subsistence and commercial crops, dominated by subsistence crops such as ragi, groundnut in Tumkur district and sorghum and redgram in Bijapur district. The two districts are yet to be well connected with terminal markets and accordingly their economic performance is modest.

- In GBFS Kappanimbargi, among the bovines possessed by rainfed farmers, indigenous cows formed 54 % and milk provided net returns of Rs. 3833 per farm annually and on an average family income is Rs.47155. Considering in DFSCFCC Markabbinahalli, among the bovines possessed by rainfed farmers, indigenous cows formed 54% and their milk fetched net returns of Rs. 3500 per farm annually and on an average family income is Rs.49564.

- In FBFSGM Tharati, among the bovines possessed by rainfed farmers, crossbred cows formed 31 percent and their milk provided net returns of Rs. 7000 annually per farm and their average family income is Rs.24454.Among the bovines possessed by irrigated farmers, cross bred cows formed 22 %and their milk and fetched net returns of Rs. 14100 per annum and their average family income is Rs.53129.

- In GBFSD Belladamadugu, among the bovines possessed by rainfed farmers, crossbred cows formed 76% and the milk provided net returns of Rs. 12637 per farm annually and on an average family income is Rs.43902.Among the bovines possessed by irrigated farmers, cross bred cows formed 75 %their milk and fetched net returns of Rs. 42000 per annum and on an average family income is Rs.97654.

- In GBFSD Belladamadugu village, the volume of Milk collected by the Dairy increased from 180 litres per day in 2000 to 500 litres per day in 2010, an increase of 17.8 percent per year.

- Thus, in the Most vulnerable rainfed area of North Karnataka - MVRANK Bijapur district, the proportion of cross breed cows is far lower (around 50%) compared with that in Southern district (75 percent) and hence there is a greater scope for breed improvement in Bijapur district.

- In MVRANK Bijapur district, the land holding of sample farmers in GBFS Kappanimbargi ranged from 4 to 8 acres and in DFSCFCC Markabbinahalli, ranged from 7 to 8 acres. In the MVRASK Tumkur district, the land holding size of sample farmers in FBFSGM Tharati ranged from 0.97 to 2 acres and in GBFSD Belladamadugu, the land holding ranged from 3.23 to 6 acres. Thus in MVRANK Bijapur district, the land holding size is at least 50 percent higher than the land holding size in MVRASK Tumkur district.

- The per capita income in the MVRANK Bijapur district is Rs. 28325 while that in MVRASK Tumkur district is Rs. 19226. However, considering the representative sample, in MVRANK Bijapur district, the gross income per acre is Rs. 35227, while in MVRASK Tumkur, the gross income per acre is Rs. 69605. The economic performance of Bijapur is better than Tumkur district because of the average land holding size in MVRANK Bijapur is 6.4 acres and while in MVRASK Tumkur is 2.1 acres but average family size is almost same in both districts. Hence, in MVRANK Bijapur the income per capita is higher and per acre is lower compared to MVRASK Tumkur district.

- In the MVRANK Bijapur district, the dimensions of agriculture growth in Green Revolution Period (1969 to 1988) are: 1: Market and irrigation supported farming and 2: Rainfed agriculture. In the Post Green Revolution Period (1989 to 2007) the dimensions are: 1: Technology lead groundwater agriculture and 2: surface irrigation lead agriculture.

- In the MVRASK Tumkur, the dimensions of agriculture growth in Green Revolution Period (1969 to 1988) are: 1: Information lead agriculture, 2: Technology lead agriculture and 3: Diversified agriculture supported by groundwater. In the Post Green Revolution Period (1989 to 2007) the dimensions are: 1: Groundwater supported high value crops, 2: Slow growth crops and 3: Irrigated agriculture. Thus in MVRANK Bijapur district, we find the transition from technology and market to surface irrigation lead agriculture due to the policy of the State in accordance with the DM Nanjundappa committee report that recommended spread of irrigation. In the case of MVRASK Tumkur district, farmers practiced diversified low value crops to irrigated high value crops.

- In the MVRANK Bijapur, during green revolution period, the probability of current fallow land has virtually reduced to zero. In post green revolution period, the probability of the net cropped area to be retained as net cropped area is 0.92.In the MVRASK Tumkur, in green revolution period, the probability of transition from forest to other cultivated land was 0.96 while in post green revolution period, the probability of retention of forest land in forest was 0.96. Thus, in both districts current fallow land has virtually reduced zero mainly because of developmental programs like grow more food campaign which facilitated farmers not to leave fallow of small and marginal land.

- In the MVRANK Bijapur, in post green revolution period the probability of retention of cereals and millets, pulses and oilseeds has been lower as compared to green revolution period. In the MVRASK Tumkur, in the green revolution period, the probability of retention of cereals and millets, pulses and oilseeds in their respective states has been : 0.93 to 0.92 while in post green revolution period, this probability has reduced : 0.64 to 0.60. Thus in both districts, due to the economic liberalization, the probability of retention of cereals and millets, pulses and oil seeds in their respective states has been lower as compared to post green revolution period which lead to economic security for farmers.

- In GBFS Kappanimbargi, The probability of shift from the state of vegetables to pulses and oilseeds is 0.86. These are indications of shift towards low water low value crops from low water, high value crops.

- In DFSCFCC Markabbinahalli, the probability of the state of moving from sorghum, pearl millet and wheat to redgram is 1, while that of moving from the state of redgram to sorghum is 0.53. In FBFSGM Tharati, the area under the most water intensive crop – sweet flag, virtually reduced to zero. Thus, the Tharati crop pattern had a *volte face* treatment, with the water intensive sweet flag almost replaced by low water flower crops such as chrysanthemum due to depletion of groundwater resource, triggered by intense sand mining activity. In GBFSD Belladamadagu, as this village is dominant for groundnut crops, the transitional probability matrix has predicted the probability of shift in the state of cereals and millets to pulses and oilseeds as 1.00.

- Thus in MVRANK Bijapur, the probability of shift from sorghum and bajra to redgram is substantial and in the case of MVRASK Tumkur, the probability of moving from *Acorus calamus* to chrysanthemum is substantial and groundnut crop retained to its original state is substantial.

- In the study villages, large proportions (40 %) of sample respondents were accessing agricultural information from word of mouth followed by progressive farmers, input dealers and *State Raitha Samparka Kendra.*

- The major markets of farmers in MVRASK Tumkur district: are Tumkur APMC, KR market Bangalore and Madhugiri APMC for different crops while in MVRANK Bijapur, the major markets are Bijapur APMC, Devarahippargi shandy and horti shandy for different crops.

- In the MVRANK Bijapur district; the marketable surplus was low(30 %)in the case of sorghum and bajra crop and also in the MVRASK Tumkur district, the marketable surplus was low (38 %) in the case of ragi crop.

- In GBFS Kappanimbargi, the off-farm employment income formed Rs.35726 (93 %) of total income followed by livestock Rs.4070 (11 %) and crop income was negative Rs.1608 (4 % because of drought) out of the total income of Rs. 38194 for rainfed farmers. For irrigated farmers, the contribution of crop income was Rs.609440 (93 %) followed by off-farm employment Rs.40288 (6 %) and livestock was near to Rs.3232 (1 %) of the total net income of Rs. 652952 per farm (it is due to grape growers).

- In DFSCFCC Markabbinahalli, rainfed farmers realized a net income of Rs. 100896 per farm of which Rs.68269 (68 %) was from off-farm employment followed by crop income Rs.30883 (31 %) and livestock Rs.1744 (2 %).

- In FBFSGM Tharati, rainfed farmers realized net income of Rs. 28332 per farm of which Rs.21778 (77 %) was from off-farm employment followed by livestock Rs.3905 (14 %) and crop income Rs.2649 (9 %). For farmers buying water for irrigation, the net income was Rs. 40345 per farm of which Rs.21344 (53 %) was from crops followed by off-farm employment Rs.15667 (39 %) and livestock Rs.3333 (9 %). In the case of irrigated farmers, the crop income contributed Rs.40619

(43.35 %), off-farm employment Rs.40223 (42.93 %) and livestock Rs.12850 (13.72 %) of the total net income of Rs. 93690 per farm.

- In GBFSD Belladamadagu, for rainfed farmers, the contribution of off-farm employment income was Rs.21750 (55 %) and Rs.29997 (38 %) for irrigated farmers. The contribution of livestock income was Rs.32496 (41 %) for irrigated farmers and Rs.7846 (20 %) for rainfed farmers. The contribution of crop income was Rs.9605 (30 %) in rainfed farmers and Rs. 17270 (23 %) for farmers with irrigation facility of the total net income of Rs. 39201 per farm in rainfed farmers and Rs.79763 per farm for irrigated farmers.
- Thus, the economy of MVRANK Bijapur district is influenced by Dr DM Nanjundappa committee report while and the economy of MVRASK Tumkur district is influenced by Bangalore urbanization.
- In GBFS Kappanimbargi, among different development programs, the largest popular development program was BPL ration card, as around 80 % of sample farmers are availing benefit. Each household availed an annual benefit of Rs. 5067 by incurring one time transaction cost of Rs. 311.The second popular development programme was loan waiver program with 61 % of sample households benefited and per household benefit was Rs. 2783 by incurring one time transaction cost of Rs. 295. Third most popular programme was Midday meal scheme with 57 % of sample households benefited and each household received benefit of Rs. 2824 for 300 school days.
- In DFSCFCC Markabbinahalli, about 93 % of the sample households received the benefit from BPL card which is the largest popular development programme offering food security for the sample farmers. Each household availed an annual benefit of Rs. 5295 by incurring one time transaction cost of Rs. 260.The second popular programme was midday meal program with 53 % of sample

households benefited and per household benefit was Rs. 4219. The third most popular programme was drought prone area program with 30 % of sample households benefited and per household benefit was Rs. 122 by incurring one time transaction cost of Rs 12.

- In FBFSGM Tharati, About 73 % of the households received the benefit from BPL card which is largest popular development programme offering food security for the sample farmers. Each household gets an annual benefit of Rs. 5134 by incurring one time transaction cost of Rs. 239.The second popular development programme is Midday meal scheme with 50 % of sample households benefited and each household got a benefit of Rs. 2700 for 300 days. About 43 % of sample households benefited from school uniform and school books and bag programmes.

- In GBFSD Belladamadagu, About 87 % of the sample households received the benefit from BPL card which is the largest popular development programme offering food security for the sample farmers. Each household availed an annual benefit of Rs. 5262 by incurring one time transaction cost of Rs. 200.The second popular development programme was drought prone area program with 30.33 % of sample households benefited and per household benefit was Rs. 111 by incurring one time transaction cost of Rs 15. The third most popular programme was Midday meal scheme with 30 % of sample households benefited and each household received a benefit of Rs. 3167 for 300 days.

- In GBFS Kappanimbargi, 29 developmental programs were listed, while 12 developmental programs benefited the rainfed farmers and 8 developmental programs benefited the farmers with irrigation facility. On an average the benefit received per household by rainfed farmers was Rs. 9425 per year and by incurring one time transaction cost of

Rs. 539 while in farmers with irrigation facility receives benefit of Rs. 7599 and by incurring one time transaction cost of Rs.495.

- In DFSCFCC Markabbinahalli, on an average rain fed farmers received benefit of Rs. 9341 from 12 developmental programs out of 32 developmental programs and by incurring one time transaction cost of Rs. 324.
- In FBFSGM Tharati, on an average, rain fed farmers received benefit of Rs. 6836 per household per year from 13 developmental programs out of 33 listed developmental programs and by incurring one time transaction cost of Rs. 277 per household per year. A farmers buying irrigation water received an average benefit of Rs. 5540 from 9 development programs and by incurring one time transaction cost of Rs. 300. The farmers with irrigation facility received on an average benefit of Rs. 10257 from 10 Government programs and by incurring one time incurring transaction cost of Rs. 426.
- In GBFSD Belladamadagu, on an average rain fed farmers receives benefit of Rs. 8822 from 13 developmental programs and by incurring one time transaction cost of Rs. 316 while in farmers with irrigation receives benefit of Rs. 5863 from 6 developmental programs and by incurring one time transaction cost of Rs. 309.
- The developmental programs in MVRANK Bijapur district are providing higher benefit of 15 % (Rs. 9170) per family than that of Rs. 7982 received per family in MVRASK Tumkur district.
- In FBFSGM Tharati regarding water markets, around 64 % of area is under rainfed and 36 % is under irrigation for water buyers, while for water sellers, about 43 % of area is rainfed and 60 % of area is under irrigation. The major difference in cropping pattern is that well owners devoted greater proportion of their land to the cultivation of chrysanthemum flower crop (58 %) and other food crops. In the case

of farmers buying irrigation water, the greater proportion of their land is devoted to the cultivation of Ragi (52 %) and next was chrysanthemum flower crop (35 %) and other crops in FBFSGM Tharati. About 55 % of farmers bought groundwater from their neighboring non-relatives. In the case of groundwater sellers, about 70 % of farmers are selling groundwater to their neighboring non-relatives. The study found that groundwater sellers realized higher net returns of Rs.46883 (48 %) compared to the farmers buying irrigation water for chrysanthemum cultivation (Rs.31620) per 1/4$^{th}$ acre and the groundwater buyer paid 1/3$^{rd}$ of gross produce income to groundwater seller.

## 6.4 Policy implications

- In the MVRANK Bijapur district, agricultural transformation lead to the shift from the Market and irrigation supported farming and Rainfed agriculture to Technology lead groundwater agriculture and Surface irrigation lead agriculture.
- In the MVRASK Tumkur district, agriculture transformation lead to the shift from the Information lead agriculture, Technology lead agriculture and Diversified agriculture supported by groundwater to Groundwater supported high value crops, Slow growth crops and Irrigated agriculture
- Thus both districts are substantially utilizing groundwater over the period. Hence, groundwater recharge programs which are not in focus at present need to be strengthened.
- In the MVRANK Bijapur district, agricultural transformation leads to the shift in the cropping pattern of jowar, bajra, onion to redgram and cotton. It indicates that the area under food crops is decreasing.

Hence, the Government has to initiate policy to encourage farmers to cultivate jowar and bajra crops.

- In the MVRASK Tumkur district, in Tharati, agriculture transformation lead to the shift in the cropping pattern of Sweet flag to Chrysanthemum due to sand mining in Tharati. There is a drastic fall in water stored in irrigation tank further affecting all village activities. Hence, the Government has to evolve policy to control sand mining.

- The extent of spread of grape growing in MVRANK Bijapur district was lower compared to extent of spread of cultivation of flower crops in MVRASK Tumkur district. This is due to lack capital investment for grape (total establishment cost of grape orchard is Rs. 3.5 to 4 lakh per hectare). Under the Horticulture Mission, efforts need to be made to promote grape crop in MVARNK Bijapur district.

- India's per capita income (2012-13) is Rs. 68,748. However, the per capita income of farmers in Bijapur district, forms only 66% of India's per capita income even considering the cultivation of high value crops like grapes. In Tumkur district, the per capita income of farmers cultivating high value flower crops forms only 53 percent of India's per capita income. Considering farmers cultivating largely food crops and no high value crops, the per capita income in Bijapur formed only 41 percent of India's per capita income, while that in Tumkur district formed only 28 per cent of India's per capita income. These indicate that farmers in the most vulnerable rainfed areas of northern and southern Karnataka are still unable to reach that of the country level with regard to per capita income. Hence, in both the districts, there is need to intensify infrastructure facility as well as social development projects. In addition good governance facilitates in inclusive growth as these two districts have higher proportion of people under Below Poverty Line (BPL).

- The development programs in MVRANK Bijapur district are providing higher benefit of 15 % (Rs.9170) per family than that of Rs.7982 received per family in MVRASK Tumkur district.
- The research study found that, the sample households have been accessing agricultural information from word of mouth (40 %)followed by progressive farmers, input dealers and *State Raitha Samparka Kendra* mainly because of their easy and convenient access. But, it is essential to improve the quality of agricultural information from these sources by providing need based agricultural training, technology, management and transfer of skills to progressive farmers; then it would play a most important role in introducing and disseminating new technologies and farming practices to farmers.
- About 35 to 40 % of developmental programmes were benefiting the farmers and 65 % of the programmes are not even listed by them. Apparently this reiterates that at grass-root level in addition to lack of awareness there is lack of required personnel who can facilitate the stakeholders to derive benefit from developmental programmes.
- The average benefit per farm family ranges from Rs. 6000 to Rs. 9000 per year considering the transaction cost incurred by stakeholders to avail the benefit from developmental programs. It is to be noted that except education schemes no program households incurred zero transaction cost and also there is no single developmental program where farmer paid no rent to authorities. Though the rents paid are around 4 to 6 percent of the total benefit which may be modest, the policy makers should ensure steps to eliminate rents through good governance.

- By selling water for agriculture purpose, the groundwater sellers realized higher net returns (Rs. 46883) which is 48 % compared to the farmers buying irrigation water for chrysanthemum cultivation (Rs.31620) and the groundwater buyer paid 1/3rd of produce income to groundwater seller (Rs.22200). This is an additional income not at the sacrifice of their original returns from agriculture. Therefore groundwater markets can be provided in rural areas as measure of equity.

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# CHAPTER VII
# REFERENCES


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# APPENDIX

**Appendix I: Assets of sample farmers in Grapes Based Farming System (GBFS) Kappanimbargi village**

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| 1. | No. of households | 250 | 275 | 320 | 28 |
| **I** | **Livestock** | | | | |
| 1 | Indigenous cow | 200 (38.46) | 180 (39.13) | 150 (36.59) | -25 |
| 2 | Cross breed cow | 0 (0.00) | 0 (0.00) | 10 (2.44) | |
| 3 | Buffalo | 220 (42.31) | 200 (43.48) | 190 (46.34) | -14 |
| 4 | Bullock | 100 (19.23) | 80 (17.39) | 60 (14.63) | -40 |
| | Total | 520 (100) | 460 (100) | 410 (100) | -21 |
| 6 | Goat | 700 | 600 | 520 | -26 |
| II | No. of Poultry in the village | 650 | 700 | 648 | -0.31 |
| **III** | **Machinery** | | | | |
| 1 | Tractor | 4 (80.00) | 15 (75.00) | 8 (53.33) | 100 |
| 2 | Auto rickshaw | 0 (0.00) | 3 (15.00) | 3 (20.00) | |
| 3 | Floor mill | 1 (20.00) | 2 (10.00) | 4 (26.67) | 300 |
| | Total | 5 (100) | 20 (100) | 15 (100) | 200 |
| **IV** | **Consumer assets** | | | | |
| 1 | Television | 2 (25.00) | 20 (44.44) | 120 (25.75) | 5900 |
| 2 | Refrigerator | 0 (0.00) | 0 (0.00) | 2 (0.43) | |
| 3 | LPG connection | 0 (0.00) | 3 (6.67) | 9 (1.93) | |
| 4 | Dish antenna | 0 (0.00) | 0 (0.00) | 10 (2.15) | |
| 5 | Motorbike/Scooty | 4 (50.00) | 12 (26.67) | 25 (5.36) | 525 |
| 6 | Mobiles | 2 (25.00) | 10 (22.22) | 300 (64.38) | 14900 |
| | Total of consumer assets | 8 (100) | 45 (100) | 466 (100) | 5725 |

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| **V** | **Houses** | | | | |
| 1 | Houses-Pucca | 150 (60.00) | 200 (72.73) | 275 (85.94) | 83 |
| 2 | Houses-Kuchcha | 60 (24.00) | 45 (16.36) | 35 (10.94) | -42 |
| 3 | Houses-Thatched | 40 (16.00) | 30 (10.91) | 10 (3.13) | -75 |
| | **Total** | **250 (100)** | **275 (100)** | **320 (100)** | **28** |
| **VI** | **Source of irrigation (Number of wells)** | | | | |
| 1 | Bore well | 70 (28.57) | 100 (32.05) | 300 (57.69) | 329 |
| 2 | Functioning bore well | 50 (20.41) | 70 (22.44) | 100 (19.23) | 100 |
| 3 | Open well | 75 (30.61) | 82 (26.28) | 100 (19.23) | 33 |
| 4 | Functioning open well | 50 (20.41) | 60 (19.23) | 20 (3.85) | -60 |
| | **Total wells** | **245 (100)** | **312 (100)** | **520 (100)** | **112** |
| **VII** | **Household** | | | | |
| 1 | Joint family | 25 (10.00) | 15 (5.45) | 10 (3.13) | -60 |
| 2 | Nuclear family | 225 (90.00) | 260 (94.55) | 310 (96.88) | 38 |
| | **Total households** | **250 (100)** | **275 (100)** | **320 (100)** | **28** |
| VIII | SHGs | 0 | 0 | 2 | |

Source: Focus Group Meeting.

Note: Figures in parentheses are the percentage to the respective total.

**Appendix II: Assets of sample farmers in Diversified Farming System with a Combination of Food and Commercial Crops (DFSCFCC) Markabbinahalli village**

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| 1. | No. of households | 300 | 350 | 392 | 31 |
| **I** | **Livestock** | | | | |
| 1 | Indigenous cow | 200 (38.46) | 140 (38.36) | 100 (35.46) | -50 |
| 2 | Cross breed cow | 0 (0.00) | 0 (0.00) | 9 (3.19) | |
| 3 | Buffalo | 150 (28.85) | 90 (24.66) | 57 (20.21) | -62 |
| 4 | Bullock | 170 (32.69) | 135 (36.99) | 116 (41.13) | -32 |
| | Total | 520 (100) | 365 (100) | 282 (100) | -46 |
| 5 | Goat | 2000 | 1750 | 1650 | -18 |
| II | No. of Poultry in the village | 1000 | 400 | 500 | -50 |
| **III** | **Machinery** | | | | |
| 1 | Tractor | 2 (50.00) | 4 (66.67) | 10 (52.63) | 400 |
| 2 | Thresher | 0 (0.00) | 0 (0.00) | 5 (26.32) | |
| 3 | Floor mill | 2 (50.00) | 2 (33.33) | 4 (21.05) | 100 |
| | **Total** | **4 (100)** | **6 (100)** | **19 (100)** | **375** |
| **IV** | **Consumer assets** | | | | |
| 1 | Television | 5 (35.71) | 20 (19.80) | 92 (21.60) | 1740 |
| 2 | Refrigerator | 0 (0.00) | 0 (0.00) | 5 (1.17) | |
| 3 | LPG connection | 4 (28.57) | 6 (5.94) | 10 (2.35) | 150 |
| 4 | Dish antenna | 0 (0.00) | 0 (0.00) | 50 (11.74) | |
| 5 | Motorbike/Scooty | 5 (35.71) | 10 (9.90) | 17 (3.99) | 240 |
| 6 | Car/Jeep | 0 (0.00) | 0 (0.57) | 2 (0.47) | |
| 7 | Mobile phones | 0 (0.00) | 65 (64.36) | 250 (58.69) | |

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| | **Total of consumer assets** | **14 (100)** | **101 (100)** | **426 (100)** | **2943** |
| **V** | **Houses** | | | | |
| 1 | Houses-Pucca | 50 (16.67) | 100 (28.57) | 307 (78.32) | 514 |
| 2 | Houses-Kuchcha | 150 (50.00) | 100 (28.57) | 80 (20.41) | -47 |
| 3 | Houses-Thatched | 100 (33.33) | 150 (42.86) | 5 (1.28) | -95 |
| | **Total** | **300 (100)** | **350 (100)** | **392 (100)** | **31** |
| **VI** | **SHGs** | **0** | **0** | **4** | |

Source: Focus Group Meeting.

Note: Figures in parentheses are the percentage to the respective total.

**Appendix III: Assets of sample farmers in Floriculture Based Farming System with Groundwater Markets (FBFSGM) Tharati village**

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| 1. | No. of households | 233 | 315 | 401 | 72 |
| **I** | **Livestock** | | | | |
| 1 | Indigenous cow | 90 (29.70) | 80 (29.09) | 65 (26.21) | -28 |
| 2 | Cross breed cow | 3 (0.99) | 15 (5.45) | 27 (10.89) | 800 |
| 3 | Buffalo | 80 (26.40) | 60 (21.82) | 53 (21.37) | -34 |
| 4 | Bullock | 130 (42.90) | 120 (43.64) | 103 (41.53) | -21 |
| | Total | 303 (100) | 275 (100) | 248 (100) | -18 |
| 5 | Sheep | 180 | 160 | 151 | -16 |
| 6 | Goat | 200 | 150 | 146 | -27 |
| II | No. of Poultry in the village | 200 | 180 | 175 | -13 |
| III | Milk Sale (liter per day) | 130 | 120 | 110 | -15 |
| IV | No. of households with milch animals | 72 | 65 | 60 | -16 |
| **V** | **Machinery** | | | | |
| 1 | Tractor | 2 (1.82) | 4 (2.31) | 10 (4.74) | 400 |
| 2 | Auto rickshaw | 1 (0.91) | 2 (1.16) | 9 (4.27) | 800 |
| 3 | Floor mill | 2 (1.82) | 2 (1.16) | 2 (0.95) | 0 |
| 4 | Irrigation Pump sets | 105 (95.45) | 165 (95.38) | 190 (90.05) | 81 |
| | **Total** | 110 (100) | 173 (100) | 211 (100) | 92 |
| **VI** | **Consumer assets** | | | | |
| 1 | Television | 10 (23.26) | 40 (22.99) | 190 (26.80) | 1800 |
| 2 | Refrigerator | 0 (0.00) | 2 (1.15) | 5 (0.71) | |
| 3 | LPG connection | 4 (9.30) | 20 (11.45) | 35 (4.94) | 775 |
| 4 | Dish antenna | 0 (0.00) | 10 (5.75) | 175 (24.68) | |
| 5 | Motorbike/Scooty | 25 | 40 | 70 | 180 |

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| | | (58.14) | (22.99) | (9.87) | |
| 6 | Car/Jeep | 0 (0.00) | 1 (0.57) | 2 (0.28) | |
| 7 | Truck/Bus | 1 (2.33) | 3 (1.72) | 6 (0.85) | 500 |
| 8 | Personal Computer | 0 (0.00) | 0 (0.00) | 4 (0.56) | |
| 6 | Sewing machines | 3 (6.98) | 8 (4.60) | 12 (1.69) | 300 |
| 7 | Mobile phones | 0 (0.00) | 50 (28.74) | 210 (29.62) | |
| | **Total of consumer assets** | **43 (100)** | **174 (100)** | **709 (100)** | **1549** |
| **VII** | **Houses** | | | | |
| 1 | Houses-Pucca | 23 (9.87) | 45 (14.29) | 85 (21.20) | 270 |
| 2 | Houses-Kuchcha | 170 (72.96) | 240 (76.19) | 293 (73.07) | 72.35 |
| 3 | Houses-Thatched | 40 (17.17) | 30 (9.52) | 23 (5.74) | -43 |
| | **Total** | **233 (100)** | **315 (100)** | **401 (100)** | **72** |
| **VIII** | **Source of irrigation (Number of wells)** | | | | |
| 1 | Bore well | 25 (23.81) | 65 (39.39) | 95 (50.00) | 280 |
| 2 | Functioning bore well | 25 (23.81) | 30 (18.18) | 48 (25.26) | 92 |
| 3 | Open well | 30 (28.57) | 40 (24.24) | 43 (22.63) | 43 |
| 4 | Functioning open well | 25 (23.81) | 30 (18.18) | 4 (2.11) | -84 |
| | Total wells | 105 (100) | 165 (100) | 190 (100) | 81 |
| IX | Dairy co-operative | 0 | 1 | 1 | |
| **X** | **Household** | | | | |
| 1 | Joint family | 20 (8.58) | 12 (3.81) | 5 (1.25) | -75 |
| 2 | Nuclear family | 213 (91.42) | 303 (96.19) | 396 (98.75) | 86 |
| | **Total households** | **233 (100)** | **315 (100)** | **401 (100)** | **72** |
| XI | SHGs | 0 | 1 | 4 | |

Source: Focus Group Meeting.Note: Figures in parentheses are the percentage to the respective total.

**Appendix IV: Assets of sample farmers in Groundnut Based Farming System with Dairy as Main Enterprise (GBFSD) Belladamadugu village**

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| 1. | No. of households | 190 | 215 | 276 | 45 |
| **I** | **Livestock** | | | | |
| 1 | Indigenous cow | 5 (2.33) | 12 (5.66) | 30 (19.35) | 500 |
| 2 | Cross breed cow | 30 (13.95) | 70 (33.02) | 100 (64.52) | 233 |
| 3 | Buffalo | 30 (13.95) | 20 (9.43) | 15 (9.68) | -50 |
| 4 | Bullock | 150 (69.77) | 110 (51.89) | 10 (6.45) | -93 |
| | Total | 215 (100) | 212 (100) | 155 (100) | -28 |
| 5 | Sheep | 400 | 300 | 610 | 53 |
| 6 | Goat | 60 | 30 | 115 | 92 |
| II | No. of Poultry in the village | 150 | 150 | 206 | 37 |
| **III** | **Milk Sale (litre per day)** | **180** | **240** | **500** | **178** |
| **IV** | No. of households with milch animals | 40 | 80 | 130 | 225 |
| **V** | **Machinery** | | | | |
| 1 | Tractor | 1 (0.74) | 1 (0.60) | 4 (1.99) | 300 |
| 2 | Auto rickshaw | 0 (0.00) | 1 (0.60) | 7 (3.48) | |
| 3 | Floor mill | 1 (0.74) | 2 (1.19) | 2 (1.00) | 100 |
| 4 | Bullock cart | 7 (5.19) | 4 (2.38) | 1 (0.50) | -86 |
| 5 | Irrigation Pump Sets | 126 (93.33) | 160 (95.24) | 187 (93.03) | 48 |
| | Total | **135 (100)** | **168 (100)** | **201 (100)** | **49** |
| **VI** | **Consumer assets** | | | | |
| 1 | Television | 5 (38.46) | 10 (14.93) | 82 (26.89) | 1540 |
| 2 | Refrigerator | 0 (0.00) | 0 (0.00) | 2 (0.66) | |
| 3 | LPG connection | 0 (0.00) | 0 (0.00) | 25 (8.20) | |

| Sl. No. | Particulars | 2000 | 2005 | 2010 | % change over 2000-2010 |
|---|---|---|---|---|---|
| 4 | Dish antenna | 0 (0.00) | 0 (0.00) | 12 (3.93) | |
| 5 | Motorbike/Scooty | 3 (23.08) | 15 (22.39) | 30 (9.84) | 900 |
| 6 | Sewing machines | 2 (15.38) | 2 (2.99) | 4 (1.31) | 100 |
| 7 | Mobiles | 3 (23.08) | 40 (59.70) | 150 (49.18) | 4900 |
| | **Total of consumer assets** | **13 (100)** | **67 (100)** | **305 (100)** | **2246** |
| **VII** | **Houses** | | | | |
| 1 | Houses-Pucca | 80 (42.11) | 110 (51.16) | 140 (50.72) | 75 |
| 2 | Houses-Kuchcha | 85 (44.74) | 85 (39.53) | 120 (43.48) | 41 |
| 3 | Houses-Thatched | 25 (13.76) | 20 (9.30) | 16 (5.80) | -36 |
| | Total | **190 (100)** | **215 (100)** | **276 (100)** | **45** |
| **VIII** | **Source of irrigation (Number of wells)** | | | | |
| 1 | Bore well | 5 (3.97) | 30 (18.75) | 87 (46.52) | 1640 |
| 2 | Functioning bore well | 1 (0.79) | 10 (6.25) | 30 (16.04) | 2900 |
| 3 | Open well | 60 (47.62) | 60 (37.50) | 60 (32.09) | 0 |
| 4 | Functioning open well | 60 (47.62) | 60 (37.50) | 10 (5.35) | -83 |
| | **Total wells** | **126 (100)** | **160 (100)** | **187 (100)** | **48** |
| IX | Dairy co-operative | 1 | 1 | 1 | 0 |
| X | **Household** | | | | |
| 1 | Joint family | 14 (7.37) | 10 (4.65) | 6 (2.17) | -57 |
| 2 | Nuclear family | 176 (92.63) | 205 (95.35) | 270 (97.83) | 53 |
| | Total households | **190 (100)** | **215 (100)** | **276 (100)** | **45** |
| XI | SHGs | 0 | 17 | 57 | |

Source: Focus Group Meeting.

Note: Figures in parentheses are the percentage to the respective total.

**Appendix V: Economics of cultivation of bajra in GBFS Kappanimbargi village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 9 | 925 | 22.07 |
| 2 | Bullock labour | Pairdays | 0.54 | 540 | 12.88 |
| 3 | Machine labour | Hours | 0.5 | 250 | 5.96 |
| 4 | Seed | Kgs. | 2 | 40 | 0.95 |
| 5 | FYM | tons | 0.12 | 41 | 0.98 |
| 6 | Chemical Fertilizers | Qtls | 0.5 | 486 | 11.59 |
| 7 | Miscellaneous | | | 17 | 0.41 |
| 8 | Opportunity cost of working capital @ 5% | | | 115 | 2.74 |
| 9 | Rental value of land | | | 1502 | 35.83 |
| 10 | Risk premium @ 2% of working capital | | | 46 | 1.10 |
| 11 | Management cost @ 10% of working capital | | | 230 | 5.49 |
| 12 | Total cost of cultivation | | | 4192 | 100 |
| | Returns | | | | |
| | Main product | Qtls | 1.94 | 3214 | |
| | By-product | Qtls | 3.1 | 789 | |
| | Intercrop output (Tur) | Qtls | 0.57 | 1953 | |
| | Gross return | Rs | | 5956 | |
| | Net return | Rs | | 1764 | |

**Appendix VI: Economics of cultivation of sorghum in GBFS Kappanimbargi village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 10 | 1040 | 17.21 |
| 2 | Bullock labour | Pairdays | 0.44 | 516 | 8.54 |
| 3 | Machine labour | Hours | 0.5 | 248 | 4.10 |
| 4 | Seed | Kgs. | 3 | 72 | 1.19 |
| 5 | FYM | tonnes | 0.67 | 143 | 2.37 |
| 6 | Chemical Fertilizers | Kgs. | 0.5 | 410 | 6.79 |
| 7 | Miscellaneous | | | 192 | 3.18 |
| 8 | Opportunity cost of working capital @ 5% | | | 131 | 2.17 |
| 9 | Rental value of land | | | 2976 | 49.26 |
| 10 | Risk premium @ 2% of working capital | | | 52 | 0.86 |
| 11 | Management cost @ 10% of working capital | | | 262 | 4.34 |
| 12 | Total cost of cultivation | | | 6042 | 100 |
| | Returns | | | | |
| | Main product | Qtls | 3 | 5172 | |
| | By-product | Qtls | 5.3 | 1329 | |
| | Intercrop output (Tur) | Qtls | | 0 | |
| | Gross return | Rs. | | 6501 | |
| | Net return | Rs. | | 459 | |

**Appendix VII: Economics of cultivation of grape in GBFS Kappanimbargi village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 129 | 17604 | 27.85 |
| 2 | Bullock labour | Pairdays | | | 0.00 |
| 3 | Machine labour | Hours | 0.52 | 287 | 0.45 |
| 4 | Seed | Kgs. | 469 | 2344 | 3.71 |
| 5 | FYM | tonnes | 11.5 | 5078 | 8.03 |
| 6 | Chemical Fertilizers | Qtls. | 4 | 3685 | 5.83 |
| 7 | Plant protection chemicals | Rs. | | 11458 | 18.13 |
| 8 | Miscellaneous | Rs. | | 4162 | 6.58 |
| 9 | Irrigation cost | | | 953 | 1.51 |
| 10 | Opportunity cost of working capital @ 5% | | | 2279 | 3.61 |
| 11 | Rental value of land | | | 9896 | 15.65 |
| 12 | Risk premium @ 2% of working capital | | | 911 | 1.44 |
| 13 | Management cost @ 10% of working capital | | | 4557 | 7.21 |
| 14 | Total cost of cultivation | | | 63214 | 100.00 |
| | Returns | Qtls | | | |
| | Main product | Qtls | 25 | 300000 | |
| | By-product | Tur | | | |
| | Intercrop output | Rs. | | | |
| | Gross return | Rs. | | 300000 | |

**Appendix VIII: Economics of cultivation of sorghum in DFSCFCC Markabbinahalli village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 16.34 | 2036 | 21.37 |
| 2 | Bullock labour | Pairdays | 1 | 800 | 8.40 |
| 3 | Machine labour | Hours | 1.42 | 500 | 5.25 |
| 4 | Seed | Kgs. | 2.8 | 56 | 0.59 |
| 5 | FYM | tons | 1.6 | 736 | 7.73 |
| 6 | Chemical Fertilizers | Qtls | 0.51 | 462 | 4.85 |
| 7 | Miscellaneous | Rs | | 138 | 1.45 |
| 8 | Opportunity cost of working capital @ 5% | | | 236 | 2.48 |
| 9 | Rental value of land | | | 3995 | 41.94 |
| 10 | Risk premium @ 2% of working capital | | | 95 | 1.00 |
| 11 | Management cost @ 10% of working capital | | | 472 | 4.95 |
| 12 | Total cost of cultivation | | | 9526 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 5.04 | 8311 | |
| | By-product | Qtls | 13.42 | 3356 | |
| | Intercrop output (bengalgram) | | 0.24 | 762 | |
| | Gross return | Rs | | 12429 | |
| | Net return | Rs | | 2903 | |

**Appendix IX: Economics of cultivation of redgram in DFSCFCC Markabbinahalli village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 16 | 1827 | 16.88 |
| 2 | Bullock labour | Pairdays | 1 | 800 | 7.39 |
| 3 | Machine labour | Hours | 0.5 | 148 | 1.37 |
| 4 | Seed | Kgs. | 6 | 304 | 2.81 |
| 5 | FYM | tons | 0.7 | 300 | 2.77 |
| 6 | Chemical Fertilizers | Qtls | 0.5 | 468 | 2.48 |
| 7 | Plant protection chemicals | | | 1795 | 18.43 |
| 8 | Miscellaneous | | | 192 | 1.77 |
| 9 | Opportunity cost of working capital @ 5% | | | 292 | 2.70 |
| 10 | Rental value of land | | | 4000 | 36.95 |
| 11 | Risk premium @ 2% of working capital | | | 117 | 1.08 |
| 12 | Management cost @ 10% of working capital | | | 583 | 5.39 |
| 13 | Total cost of cultivation | | | 10826 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 3.92 | 13703 | |
| | By-product | Qtls | 10.2 | 1530 | |
| | Intercrop output | Qtls | | 0 | |
| | Gross return | Rs | | 15233 | |
| | Net return | Rs | | 4407 | |

**Appendix X: Economics of cultivation of bengalgram in DFSCFCC Markabbinahalli village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 17 | 1920 | 17.56 |
| 2 | Bullock labour | Pairdays | 0.94 | 749 | 6.85 |
| 3 | Machine labour | Hours | 0.47 | 142 | 1.30 |
| 4 | Seed | Kgs. | 22.5 | 1150 | 10.52 |
| 5 | FYM | tons | 1.39 | 549 | 5.02 |
| 6 | Chemical Fertilizers | Qtls | 0.3 | 314 | 2.87 |
| 7 | Plant protection chemicals | | | 1181 | 10.80 |
| 8 | Miscellaneous | | | 139 | 1.27 |
| 9 | Opportunity cost of working capital @ 5% | | | 307 | 2.81 |
| 10 | Rental value of land | | | 3745 | 34.25 |
| 11 | Risk premium @ 2% of working capital | | | 123 | 1.13 |
| 12 | Management cost @ 10% of working capital | | | 614 | 5.62 |
| 13 | Total cost of cultivation | | | 10933 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 2.85 | 12663 | |
| | By-product | Qtls | 3.48 | 514 | |
| | Intercrop output (Jowar) | Qtls | 0.18 | 298 | |
| | Gross return | Rs | | 13475 | |
| | Net return | Rs | | 2542 | |

**Appendix XI: Economics of cultivation of cotton in DFSCFCC Markabbinahalli village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 34 | 3580 | 22.07 |
| 2 | Bullock labour | Pairdays | 1 | 790 | 4.87 |
| 3 | Machine labour | Hours | 0.5 | 148 | 0.91 |
| 4 | Seed | Kgs. | 1 | 1920 | 11.84 |
| 5 | FYM | tons | 0.5 | 240 | 1.48 |
| 6 | Chemical Fertilizers | Qtls | 1.2 | 1327 | 8.18 |
| 7 | Plant protection chemicals | Rs | | 1842 | 11.36 |
| 8 | Miscellaneous | | | 638 | 3.93 |
| 9 | Opportunity cost of working capital @ 5% | | | 524 | 3.23 |
| 10 | Rental value of land | | | 3953 | 24.37 |
| 11 | Risk premium @ 2% of working capital | | | 210 | 1.29 |
| 12 | Management cost @ 10% of working capital | | | 1049 | 6.47 |
| 13 | Total cost of cultivation | | | 16221 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 5.4 | 21741 | |
| | By-product | Qtls | 7.6 | 382 | |
| | Intercrop output | | | 0 | |
| | Gross return | Rs | | 22123 | |
| | Net return | Rs | | 5902 | |

**Appendix XII: Economics of cultivation of ragi in FBFSGM Tharati**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) |
|---|---|---|---|---|
| A | **Variable costs** | | | |
| 1 | Human labour | Mandays | 18 | 2105 (47.40) |
| 2 | Bullock labour | Pairdays | 1 | 238 (5.36) |
| 3 | Machine labour | Hours | 1 | 251 (5.65) |
| 4 | Seed | Kgs. | 4 | 100 (2.25) |
| 5 | FYM | tons | 2 | 606 (13.65) |
| 6 | Chemical Fertilizers | Qtls | 1.2 | 903 (20.33) |
| 7 | Miscellaneous | | | 238 (5.36) |
| 8 | Total variable cost | | | 4441 (66.30) |
| 9 | Opportunity cost of working capital @ 5% | | | 222 (3.31) |
| 10 | Rental value of land | | | 1503 (22.44) |
| 11 | Risk premium @ 2% of working capital | | | 89 (1.33) |
| 12 | Management cost @ 10% of working capital | | | 444 (6.62) |
| 13 | **Total cost of cultivation** | | | 6699 (100.00) |
| C | **Returns** | | | |
| | Main product | Qtls | 4 | 7294 |
| | By-product | Qtls | 8 | 2532 |
| | Intercrop output (Tur) | Qtls | 0.10 | 415 |
| | Gross return | Rs | | 10241 |
| D | Net return | Rs | | 3542 |

Note: Figures in parentheses indicate percentages to total

**Appendix XIII: Economics of cultivation of maize in FBFSGM Tharati village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 22 | 2645 | 26.28 |
| 2 | Bullock labour | Pairdays | 2 | 870 | 8.64 |
| 3 | Machine labour | Hours | 1 | 362 | 3.60 |
| 4 | Seed | Kgs. | 7 | 880 | 8.74 |
| 5 | FYM | tons | 3 | 870 | 8.64 |
| 6 | Chemical Fertilizers | Qtls | 2 | 1426 | 14.17 |
| 7 | Miscellaneous | | | 272 | 2.70 |
| 8 | Opportunity cost of working capital @ 5% | | | 366 | 3.64 |
| 9 | Rental value of land | | | 1495 | 14.85 |
| 10 | Risk premium @ 2% of working capital | | | 147 | 1.46 |
| 11 | Management cost @ 10% of working capital | | | 733 | 7.28 |
| 12 | Total cost of cultivation | | | 10066 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 11 | 11803 | |
| | By-product | Qtls | 8 | 2083 | |
| | Intercrop output | | | 0 | |
| | Gross return | Rs | | 13886 | |
| | Net return | Rs | | 3820 | |

**Appendix XIV: Economics of cultivation of paddy in FBFSGM Tharati village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 34 | 3729 | 17.11 |
| 2 | Bullock labour | Pairdays | 2 | 741 | 3.40 |
| 3 | Machine labour | Hours | 1 | 463 | 2.12 |
| 4 | Seed | Kgs. | 26 | 898 | 4.12 |
| 5 | FYM | tons | 4 | 1237 | 5.68 |
| 6 | Chemical Fertilizers | Qtls | 3 | 3032 | 13.91 |
| 7 | Plant protection chemicals | | | 600 | 2.75 |
| 8 | Irrigation cost | | | 837 | 3.84 |
| 9 | Miscellaneous | | | 304 | 1.40 |
| 10 | Opportunity cost of working capital @ 5% | | | 592 | 2.72 |
| 11 | Rental value of land | | | 7937 | 36.42 |
| 12 | Risk premium @ 2% of working capital | | | 237 | 1.09 |
| 13 | Management cost @ 10% of working capital | | | 1184 | 5.43 |
| 14 | Total cost of cultivation | | | 21791 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 18 | 22230 | |
| | By-product | Qtls | 14 | 2725 | |
| | Intercrop output | | | | |
| | Gross return | | | 24955 | |
| | Net return | | | 3164 | |

**Appendix XV: Economics of cultivation of ragi in GBFSD Belladamadugu village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 17 | 1560 | 25.65 |
| 2 | Bullock labour | Pairdays | 1 | 200 | 3.29 |
| 3 | Machine labour | Hours | 1 | 315 | 5.18 |
| 4 | Seed | Kgs. | 5 | 124 | 2.04 |
| 5 | FYM | tons | 3 | 1320 | 21.70 |
| 6 | Chemical Fertilizers | Qtls | 1 | 940 | 15.46 |
| 7 | Miscellaneous | | | 150 | 2.47 |
| 8 | Opportunity cost of working capital @ 5% | | | 230 | 3.78 |
| 9 | Rental value of land | | | 690 | 11.34 |
| 10 | Risk premium @ 2% of working capital | | | 92 | 1.51 |
| 11 | Management cost @ 10% of working capital | | | 461 | 7.58 |
| 12 | Total cost of cultivation | | | 6082 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 4 | 6268 | |
| | By-product | Qtls | 10 | 4093 | |
| | Intercrop output (Jowar) | Qtls | 0.1 | 278 | |
| | Gross return | | | 10639 | |
| | Net return | | | 4557 | |

**Appendix XVI: Economics of cultivation of groudnut in GBFSD Belladamadugu village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 18 | 1902 | 21.73 |
| 2 | Bullock labour | Pairdays | 0.51 | 383 | 4.38 |
| 3 | Machine labour | Hours | 0.5 | 275 | 3.14 |
| 4 | Seed | Kgs. | 36.26 | 1334.68 | 15.25 |
| 5 | FYM | tons | 2.89 | 1166.67 | 13.33 |
| 6 | Chemical Fertilizers | Qtls | 1.51 | 1814 | 20.73 |
| 7 | Miscellaneous | | | 91 | 1.04 |
| 8 | Opportunity cost of working capital @ 5% | | | 348 | 3.98 |
| 9 | Rental value of land | | | 600 | 6.86 |
| 10 | Risk premium @ 2% of working capital | | | 139 | 1.59 |
| 11 | Management cost @ 10% of working capital | | | 697 | 7.96 |
| 12 | Total cost of cultivation | | | 8751 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 2.56 | 9447 | |
| | By-product | Qtls | 7.18 | 2871 | |
| | Intercrop output (cowpea) | Qtls | 0.6 | 210 | |
| | Gross return | | | 12528 | |
| | Net return | | | 3777 | |

**Appendix XVII: Economics of cultivation of paddy in GBFSD Belladamadugu village**

(on per acre basis)

| Sl. No. | Particulars | Unit | Quantity | Value (Rs.) | % |
|---|---|---|---|---|---|
| 1 | Human labour | Mandays | 31 | 3398 | 22.88 |
| 2 | Bullock labour | Pairdays | 1 | 945 | 6.36 |
| 3 | Machine labour | Hours | 1 | 521 | 3.51 |
| 4 | Seed | Kgs. | 27 | 726 | 4.89 |
| 5 | FYM | tons | 4 | 1392 | 9.37 |
| 6 | Chemical Fertilizers | Qtls | 3 | 2381 | 16.03 |
| 7 | Plant protection chemicals | | | 492 | 3.31 |
| 8 | Irrigation cost | | | 958 | 6.45 |
| 9 | Miscellaneous | | | 606 | 4.08 |
| 10 | Opportunity cost of working capital @ 5% | | | 571 | 3.84 |
| 11 | Rental value of land | | | 1491 | 10.04 |
| 12 | Risk premium @ 2% of working capital | | | 228 | 1.54 |
| 13 | Management cost @ 10% of working capital | | | 1142 | 7.69 |
| 14 | Total cost of cultivation | | | 14851 | 100.00 |
| | Returns | | | | |
| | Main product | Qtls | 13 | 18741 | |
| | By-product | Qtls | 21 | 5303 | |
| | Intercrop output | | | 0 | |
| | Gross return | | | 24044 | |
| | Net return | | | 9193 | |

**Appendix XVIII : Cropping pattern of VDSA Farmers in Kappanimbargi during 2009**

| Farmers Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Summer | Groundnut | 1.21 | 100 |
| Small | Kharif | Cowpea | 0.16 | 1 |
| | | Groundnut | 0.86 | 6 |
| | | Pearl millet | 1.86 | 14 |
| | | Pigeonpea | 0.15 | 1 |
| | Rabi | Chickpea | 0.32 | 2 |
| | | Sorghum | 6.93 | 51 |
| | | Wheat | 0.93 | 7 |
| | Summer | Groundnut | 1.92 | 14 |
| | Perennial | Ber | 0.15 | 1 |
| | | Ber | 0.30 | 2 |
| | Total area (ha) | | 13.60 | 100 |
| Medium | Kharif | Cotton | 0.40 | 2 |
| | | Cowpea | 0.20 | 1 |
| | | Greengram | 0.20 | 1 |
| | | Groundnut | 1.82 | 8 |
| | | Maize | 0.81 | 4 |
| | | Pearl millet | 1.82 | 8 |
| | | Sunflower | 0.81 | 4 |
| | Rabi | Chickpea | 1.01 | 4 |
| | | Maize | 1.84 | 8 |
| | | Sorghum | 7.08 | 31 |
| | | Wheat | 1.82 | 8 |
| | Summer | Groundnut | 1.44 | 6 |
| | | Maize | 0.81 | 4 |
| | | Onion | 0.81 | 4 |
| | Perennial | Ber | 1.21 | 5 |
| | | Jasmine | 0.20 | 1 |
| | | Lemon | 0.40 | 2 |
| | Total area (ha) | | 22.70 | 100 |

**Conti...**

| Farmers Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Cowpea | 2.43 | 3 |
| | | Groundnut | 3.64 | 4 |
| | | Horsegram | 1.82 | 2 |
| | | Maize | 2.83 | 3 |
| | | Onion | 1.01 | 1 |
| | | Pearl millet | 8.46 | 9 |
| | | Pigeonpea | 9.51 | 10 |
| | | Sunflower | 1.62 | 2 |
| | Rabi | Chickpea | 3.60 | 4 |
| | | Groundnut | 2.02 | 2 |
| | | Onion | 0.27 | 0 |
| | | Sorghum | 31.46 | 34 |
| | | Sorghum Fodder | 0.40 | 0 |
| | | Vegetable | 0.34 | 0 |
| | | Wheat | 5.77 | 6 |
| | Summer | Groundnut | 5.11 | 5 |
| | Annual | Sugarcane | 4.05 | 4 |
| | Perennial | Grapes | 7.99 | 9 |
| | | Jasmine | 0.10 | 0 |
| | | Lemon | 1.11 | 1 |
| | Total area (ha) | | 93.55 | 100 |

**Appendix IXX : Cropping pattern of VDSA Farmers in Kappanimbargi during 2010**

| Farmers Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Cotton | 0.81 | 7 |
| | | Cowpea | 0.04 | 0 |
| | | Greengram | 2.43 | 22 |
| | | Groundnut | 0.81 | 7 |
| | | Horsegram | 0.04 | 0 |
| | | Maize | 0.81 | 7 |
| | | Pearl millet | 0.81 | 7 |
| | | Pigeonpea | 3.16 | 29 |
| | Rabi | Sorghum | 1.21 | 11 |
| | Summer | Groundnut | 0.81 | 7 |
| | Total area (ha) | | 10.93 | 100 |
| Small | Kharif | Cotton | 1.62 | 9 |
| | | Cowpea | 0.20 | 1 |
| | | Greengram | 0.96 | 5 |
| | | Groundnut | 1.01 | 5 |
| | | Horsegram | 0.20 | 1 |
| | | Maize | 1.21 | 6 |
| | | Onion | 0.40 | 2 |
| | | Pearl millet | 0.73 | 4 |
| | | Pigeonpea | 6.02 | 32 |
| | Rabi | Chickpea | 0.57 | 3 |
| | | Maize | 0.32 | 2 |
| | | Sorghum | 2.06 | 11 |
| | | Wheat | 1.52 | 8 |
| | Summer | Groundnut | 0.81 | 4 |
| | | Watermelon | 1.01 | 5 |
| | Perennial | Ber | 0.04 | 0 |
| | | Groundnut | 0.27 | 1 |
| | Total area (ha) | | 18.96 | 100 |
| Medium | Kharif | Cotton | 0.30 | 2 |
| | Rabi | Chickpea | 0.40 | 3 |
| | | Maize | 2.23 | 14 |
| | | Sorghum | 5.06 | 32 |
| | | Wheat | 3.86 | 25 |
| | Summer | Groundnut | 1.21 | 8 |
| | | Sunflower | 0.40 | 3 |
| | Perennial | Ber | 1.21 | 8 |
| | | Jasmine | 0.20 | 1 |
| | | Lemon | 0.40 | 3 |
| | | Pomegranate | 0.40 | 3 |
| | Total area (ha) | | 15.70 | 100 |

**Conti...**

| Farmers Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Cotton | 2.53 | 3 |
| | | Cowpea | 1.58 | 2 |
| | | Greengram | 9.21 | 12 |
| | | Groundnut | 5.71 | 8 |
| | | Horsegram | 0.56 | 1 |
| | | Maize | 3.64 | 5 |
| | | Pearl millet | 2.54 | 3 |
| | | Pigeonpea | 11.00 | 15 |
| | | Sunflower | 1.01 | 1 |
| | | Vegetable | 0.10 | 0 |
| | Rabi | Chickpea | 2.53 | 3 |
| | | Cowpea | 0.49 | 1 |
| | | Horsegram | 0.49 | 1 |
| | | Maize | 1.82 | 2 |
| | | Sorghum | 8.24 | 11 |
| | | Sunflower | 2.43 | 3 |
| | | Wheat | 4.65 | 6 |
| | Summer | Groundnut | 1.62 | 2 |
| | | Onion | 1.21 | 2 |
| | Annual | Green Grass | 0.16 | 0 |
| | | Sugarcane | 3.84 | 5 |
| | Perennial | Grapes | 7.99 | 11 |
| | | Jasmine | 0.10 | 0 |
| | | Lemon | 0.71 | 1 |
| | Total area (ha) | | 74.16 | 100 |

**Appendix XX : Cropping pattern of VDSA Farmers in Kappanimbargi during 2011**

| Farmer Groups | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Groundnut | 0.20 | 12 |
| | | Pearl millet | 1.42 | 88 |
| | Total area (ha) | | 1.62 | 100 |
| Small | Kharif | Current Fallow | 0.00 | 0 |
| | | Groundnut | 0.61 | 4 |
| | | Horsegram | 0.10 | 1 |
| | | Maize | 4.78 | 28 |
| | | Pearl millet | 2.73 | 16 |
| | | Pigeonpea | 1.62 | 10 |
| | Rabi | Chickpea | 0.81 | 5 |
| | | Sorghum | 3.04 | 18 |
| | Total area (ha) | | 16.92 | 100 |
| Medium | Kharif | Chillies | 0.20 | 1 |
| | | Cotton | 0.81 | 2 |
| | | Cowpea | 0.32 | 1 |
| | | Current Fallow | 0.00 | 0 |
| | | Greengram | 0.20 | 1 |
| | | Groundnut | 1.42 | 4 |
| | | Horsegram | 0.12 | 0 |
| | | Maize | 2.65 | 8 |
| | | Maize Fodder | 0.20 | 1 |
| | | Pearl millet | 8.78 | 26 |
| | | Pigeonpea | 10.50 | 31 |
| | Rabi | Chickpea | 0.81 | 2 |
| | | Sorghum | 3.64 | 11 |
| | | Wheat | 2.02 | 6 |
| | Annual | Turmeric | 0.30 | 1 |
| | Perennial | Ber | 1.21 | 4 |
| | | Jasmine | 0.20 | 1 |
| | | Lemon | 0.40 | 1 |
| | | Pomegranate | 0.61 | 2 |
| | Total area (ha) | | 34.42 | 100 |

**Conti...**

| Farmer Groups | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Cluster Bean | 0.05 | 0 |
| | | Cowpea | 1.42 | 3 |
| | | Cucumber | 0.05 | 0 |
| | | Current Fallow | 0.00 | 0 |
| | | Greengram | 1.21 | 2 |
| | | Groundnut | 1.21 | 2 |
| | | Horsegram | 0.81 | 1 |
| | | Lady's Finger | 0.05 | 0 |
| | | Leafy Vegetable | 0.05 | 0 |
| | | Maize | 6.68 | 12 |
| | | Onion | 1.11 | 2 |
| | | Paddy | 0.40 | 1 |
| | | Pearl millet | 9.81 | 18 |
| | | Pigeonpea | 2.12 | 4 |
| | | Sunflower | 2.02 | 4 |
| | | Cotton | 0.71 | 1 |
| | Rabi | Chickpea | 0.04 | 0 |
| | | Sorghum | 13.76 | 25 |
| | | Wheat | 0.97 | 2 |
| | Annual | Sugarcane | 3.44 | 6 |
| | Perennial | Grapes | 7.99 | 15 |
| | | Grass | 0.20 | 0 |
| | | Jasmine | 0.10 | 0 |
| | | Lemon | 0.71 | 1 |
| | Total area (ha) | | 54.94 | 100 |

**Appendix XXI: Cropping pattern of VDSA Farmers in Markabbinahalli during 2009**

| Farmer Groups | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Small | Kharif | Cotton | 2.12 | 20 |
| | | Onion | 0.61 | 6 |
| | | Pearl millet | 0.40 | 4 |
| | | Pigeonpea | 2.02 | 19 |
| | Rabi | Agashi | 0.24 | 2 |
| | | Chickpea | 1.05 | 10 |
| | | Safflower | 0.08 | 1 |
| | | Sorghum | 2.08 | 19 |
| | | Wheat | 2.11 | 20 |
| | Total area (ha) | | 10.72 | 100 |
| Medium | Kharif | Cotton | 0.61 | 3 |
| | | Pigeonpea | 9.21 | 39 |
| | | Sunflower | 0.81 | 3 |
| | Rabi | Agashi | 0.14 | 1 |
| | | Chickpea | 4.33 | 18 |
| | | Safflower | 0.33 | 1 |
| | | Sorghum | 2.09 | 9 |
| | | Sunflower | 3.24 | 14 |
| | | Wheat | 2.93 | 12 |
| | Total area (ha) | | 23.67 | 100 |
| Large | Kharif | Cotton | 1.82 | 2 |
| | | Pigeonpea | 10.93 | 13 |
| | Rabi | Agashi | 0.65 | 1 |
| | | Chickpea | 29.01 | 34 |
| | | Safflower | 9.53 | 11 |
| | | Sorghum | 17.65 | 21 |
| | | Sunflower | 4.35 | 5 |
| | | Wheat | 11.35 | 13 |
| | Total area (ha) | | 85.29 | 100 |

**Appendix XXII: Cropping pattern of VDSA Farmers in Markabbinahalli during 2010**

| Farmer Groups | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Small | Kharif | Cotton | 2.63 | 11 |
| | | Onion | 0.61 | 2 |
| | | Pigeonpea | 11.03 | 45 |
| | Rabi | Chickpea | 0.89 | 4 |
| | | Safflower | 0.23 | 1 |
| | | Sorghum | 5.66 | 23 |
| | | Sunflower | 2.02 | 8 |
| | | Wheat | 1.42 | 6 |
| | Total area (ha) | | 24.48 | 100 |
| Medium | Kharif | Cotton | 2.73 | 12 |
| | | Onion | 0.30 | 1 |
| | | Pigeonpea | 12.24 | 56 |
| | Rabi | Agashi | 0.10 | 0 |
| | | Chickpea | 2.60 | 12 |
| | | Safflower | 0.85 | 4 |
| | | Sorghum | 1.73 | 8 |
| | | Wheat | 1.29 | 6 |
| | Total area (ha) | | 21.85 | 100 |
| Large | Kharif | Cotton | 2.83 | 3 |
| | | Onion | 3.24 | 3 |
| | | Pigeonpea | 24.69 | 24 |
| | | Sunflower | 3.24 | 3 |
| | Rabi | Agashi | 0.16 | 0 |
| | | Chickpea | 34.04 | 33 |
| | | Safflower | 3.77 | 4 |
| | | Sorghum | 20.63 | 20 |
| | | Sunflower | 0.81 | 1 |
| | | Wheat | 9.48 | 9 |
| | Total area (ha) | | 102.89 | 100 |

**Appendix XXIII: Cropping pattern of VDSA Farmers in Markabbinahalli during 2011**

| Farmer Groups | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Cotton | 0.61 | 38 |
| | Rabi | Chickpea | 0.20 | 12 |
| | | Sorghum | 0.61 | 38 |
| | | Wheat | 0.20 | 12 |
| | Total area (ha) | | 1.62 | 100 |
| Small | Kharif | Cotton | 4.65 | 34 |
| | | Onion | 0.30 | 2 |
| | | Pigeonpea | 3.84 | 28 |
| | Rabi | Chickpea | 1.20 | 9 |
| | | Sorghum | 2.95 | 22 |
| | | Wheat | 0.61 | 4 |
| | Total area (ha) | | 13.56 | 100 |
| Medium | Kharif | Cotton | 5.36 | 27 |
| | | Onion | 1.62 | 8 |
| | | Pigeonpea | 7.39 | 38 |
| | | Sunflower | 0.81 | 4 |
| | Rabi | Chickpea | 0.71 | 4 |
| | | Sorghum | 3.44 | 18 |
| | | Wheat | 0.30 | 2 |
| | Total area (ha) | | 19.63 | 100 |
| Large | Kharif | Cotton | 8.09 | 10 |
| | | Onion | 2.02 | 3 |
| | | Pigeonpea | 16.59 | 21 |
| | Rabi | Chickpea | 24.18 | 30 |
| | | Safflower | 2.53 | 3 |
| | | Sorghum | 21.65 | 27 |
| | | Wheat | 5.16 | 6 |
| | Total area (ha) | | 80.23 | 100 |

**Appendix IVXX: Cropping pattern of VDSA Farmers in Tharati during 2009**

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Cowpea | 0.03 | 6 |
| | | Finger Millet | 0.47 | 92 |
| | | Horsegram | 0.01 | 2 |
| | Total area (ha) | | 0.51 | 100 |
| Small | Kharif | Chrysanthemum | 0.10 | 4 |
| | | Cowpea | 0.03 | 1 |
| | | D Lab Lab | 0.03 | 1 |
| | | Finger Millet | 1.72 | 60 |
| | | Groundnut | 0.19 | 7 |
| | | Horsegram | 0.16 | 6 |
| | | Maize Fodder | 0.03 | 1 |
| | | Paddy | 0.10 | 4 |
| | | Pigeonpea | 0.25 | 9 |
| | Rabi | Chrysanthemum | 0.10 | 4 |
| | Perennial | Jasmine | 0.15 | 5 |
| | Total area (ha) | | 2.87 | 100 |
| Medium | Kharif | Chrysanthemum | 0.30 | 7 |
| | | Cowpea | 0.06 | 1 |
| | | D Lab Lab | 0.03 | 1 |
| | | Finger Millet | 1.61 | 37 |
| | | Horsegram | 0.04 | 1 |
| | | Paddy | 0.51 | 12 |
| | | Pigeonpea | 0.24 | 6 |
| | | Sorghum Fodder | 0.08 | 2 |
| | | Chrysanthemum | 0.04 | 1 |
| | Rabi | Chrysanthemum | 0.15 | 3 |
| | | Finger Millet | 0.10 | 2 |
| | | Paddy | 0.20 | 5 |
| | Perennial | Arecanut | 0.78 | 18 |
| | | Betel Vine | 0.04 | 1 |
| | | Jasmine | 0.15 | 3 |
| | Total area (ha) | | 4.34 | 100 |

Cont…

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Aster | 0.30 | 3 |
| | | Brinjal | 0.10 | 1 |
| | | Carrot | 0.40 | 4 |
| | | Chrysanthemum | 0.20 | 2 |
| | | D Lab Lab | 0.16 | 2 |
| | | Finger Millet | 3.08 | 31 |
| | | Groundnut | 0.10 | 1 |
| | | Horsegram | 0.16 | 2 |
| | | Paddy | 1.21 | 12 |
| | | Pigeonpea | 0.36 | 4 |
| | | Sorghum | 0.08 | 1 |
| | | Amaranthus | 0.04 | 0 |
| | | Chrysanthemum | 0.02 | 0 |
| | | Tomato | 0.04 | 0 |
| | | Sweet Potato | 0.02 | 0 |
| | Rabi | China Aster | 0.25 | 3 |
| | | Chrysanthemum | 0.05 | 0 |
| | | Finger Millet | 0.40 | 4 |
| | Annual | Acarus Calamus | 0.30 | 3 |
| | | Aster | 0.10 | 1 |
| | | Banana | 0.10 | 1 |
| | Perennial | Arecanut | 1.91 | 19 |
| | | Banana | 0.06 | 1 |
| | | Betel Vine | 0.11 | 1 |
| | | Coconut | 0.22 | 2 |
| | Total area (ha) | | 9.81 | 100 |

**Appendix XXV: Cropping pattern of VDSA Farmers in Tharati during 2010**

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | China Aster | 0.20 | 13 |
| | | Chrysanthemum | 0.20 | 13 |
| | | Finger Millet | 1.05 | 69 |
| | | Groundnut | 0.02 | 1 |
| | | Pigeonpea | 0.04 | 3 |
| | Total area (ha) | | 1.52 | 100 |
| Small | Kharif | Chrysanthemum | 0.15 | 4 |
| | | Cowpea | 0.02 | 0 |
| | | Finger Millet | 1.91 | 57 |
| | | Groundnut | 0.17 | 5 |
| | | Horsegram | 0.13 | 4 |
| | | Maize | 0.10 | 3 |
| | | Maize Fodder | 0.11 | 3 |
| | | Pigeonpea | 0.44 | 13 |
| | Rabi | China Aster | 0.10 | 3 |
| | | Chrysanthemum | 0.05 | 1 |
| | Perennial | Jasmine | 0.20 | 6 |
| | Total area (ha) | | 3.38 | 100 |
| Medium | Kharif | China Aster | 0.05 | 1 |
| | | Chrysanthemum | 0.52 | 10 |
| | | Cowpea | 0.02 | 0 |
| | | D Lab Lab | 0.04 | 1 |
| | | Finger Millet | 2.14 | 41 |
| | | Groundnut | 0.10 | 2 |
| | | Horsegram | 0.06 | 1 |
| | | Maize Fodder | 0.05 | 1 |
| | | Paddy | 0.30 | 6 |
| | | Pigeonpea | 0.47 | 9 |
| | | Chrysanthemum | 0.04 | 1 |
| | Rabi | Chrysanthemum | 0.37 | 7 |
| | Perennial | Arecanut | 0.88 | 17 |
| | | Betel Vine | 0.04 | 1 |
| | | Jasmine | 0.15 | 3 |
| | Total area (ha) | | 5.23 | 100 |

Cont…

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | China Aster | 0.20 | 2 |
| | | Chrysanthemum | 0.81 | 7 |
| | | Cowpea | 0.04 | 0 |
| | | Finger Millet | 2.39 | 22 |
| | | Groundnut | 0.36 | 3 |
| | | Horsegram | 0.12 | 1 |
| | | Paddy | 1.52 | 14 |
| | | Pigeonpea | 0.87 | 8 |
| | | Sorghum Fodder | 0.47 | 4 |
| | | Tomato | 0.10 | 1 |
| | | Cowpea | 0.02 | 0 |
| | | Pigeonpea | 0.02 | 0 |
| | Rabi | Chrysanthemum | 0.91 | 8 |
| | | Paddy | 0.20 | 2 |
| | Summer | Chrysanthemum | 0.20 | 2 |
| | Annual | Acarus Calamus | 0.10 | 1 |
| | | Banana | 0.20 | 2 |
| | Perennial | Arecanut | 2.00 | 18 |
| | | Banana | 0.06 | 1 |
| | | Betel Vine | 0.11 | 1 |
| | | Coconut | 0.22 | 2 |
| | Total area (ha) | | 10.92 | 100 |

**Appendix XXVI: Cropping pattern of VDSA Farmers in Tharati during 2011**

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Chrysanthemum | 0.51 | 26 |
| | | Cowpea | 0.02 | 1 |
| | | D Lab Lab | 0.01 | 1 |
| | | Finger Millet | 0.55 | 28 |
| | | Groundnut | 0.16 | 8 |
| | | Paddy | 0.10 | 5 |
| | | Pigeonpea | 0.07 | 4 |
| | Rabi | Chrysanthemum | 0.20 | 11 |
| | Summer | Chrysanthemum | 0.30 | 16 |
| | Total area (ha) | | 1.92 | 100 |
| Small | Kharif | Cowpea | 0.16 | 4 |
| | | D Lab Lab | 0.01 | 0 |
| | | Finger Millet | 2.52 | 60 |
| | | Maize | 0.83 | 20 |
| | | Paddy | 0.10 | 2 |
| | | Pigeonpea | 0.23 | 5 |
| | Rabi | Chrysanthemum | 0.05 | 1 |
| | Summer | Chrysanthemum | 0.10 | 2 |
| | Perennial | Jasmine | 0.20 | 5 |
| | Total area (ha) | | 4.20 | 100 |
| Medium | Kharif | Chrysanthemum | 0.51 | 9 |
| | | Cowpea | 0.05 | 1 |
| | | D Lab Lab | 0.06 | 1 |
| | | Finger Millet | 1.20 | 22 |
| | | Groundnut | 0.08 | 1 |
| | | Maize | 0.34 | 6 |
| | | Paddy | 0.88 | 16 |
| | | Pigeonpea | 0.28 | 5 |
| | | Sorghum Fodder | 0.05 | 1 |
| | Rabi | Chrysanthemum | 0.10 | 2 |
| | Summer | Chrysanthemum | 0.51 | 9 |
| | | Finger Millet | 0.40 | 7 |
| | Perennial | Arecanut | 0.92 | 16 |
| | | Betel Vine | 0.04 | 1 |
| | | Jasmine | 0.15 | 3 |
| | Total area (ha) | | 5.58 | 100 |

Cont…

| Farmer Group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Carrot | 0.40 | 4 |
| | | Chrysanthemum | 0.71 | 7 |
| | | Cowpea | 0.02 | 0 |
| | | Finger Millet | 0.89 | 9 |
| | | Groundnut | 0.20 | 2 |
| | | Horsegram | 0.65 | 6 |
| | | Maize | 0.51 | 5 |
| | | Maize Fodder | 0.30 | 3 |
| | | Paddy | 1.42 | 14 |
| | | Pigeonpea | 0.77 | 7 |
| | | Sorghum Fodder | 0.10 | 1 |
| | Rabi | Carrot | 0.20 | 2 |
| | | Chrysanthemum | 0.51 | 5 |
| | Summer | Chrysanthemum | 1.01 | 10 |
| | Perennial | Arecanut | 2.17 | 21 |
| | | Banana | 0.06 | 1 |
| | | Betel Vine | 0.13 | 1 |
| | | Coconut | 0.22 | 2 |
| | Total area (ha) | | 10.27 | 100 |

## Appendix XXVII: Cropping pattern of VDSA Farmers in Belladamadugu during 2009

| Farmer group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Cowpea | 0.10 | 3 |
| | | Finger Millet | 0.20 | 6 |
| | | Groundnut | 0.70 | 22 |
| | | Paddy | 0.81 | 26 |
| | | Pigeonpea | 0.12 | 4 |
| | Rabi | Finger Millet | 0.20 | 6 |
| | | Groundnut | 0.20 | 6 |
| | | Paddy | 0.81 | 26 |
| | Total area (ha) | | 3.14 | 100 |
| Small | Kharif | Avare | 0.06 | 1 |
| | | Castor | 0.06 | 1 |
| | | Cowpea | 0.24 | 3 |
| | | Finger Millet | 0.40 | 5 |
| | | Groundnut | 2.96 | 39 |
| | | Horsegram | 0.13 | 2 |
| | | Paddy | 1.82 | 24 |
| | | Pigeonpea | 0.59 | 8 |
| | Rabi | Groundnut | 1.11 | 15 |
| | | Paddy | 0.20 | 3 |
| | Total area (ha) | | 7.59 | 100 |
| Medium | Kharif | Cowpea | 0.76 | 7 |
| | | Finger Millet | 0.61 | 6 |
| | | Groundnut | 5.69 | 55 |
| | | Horsegram | 0.20 | 2 |
| | | Paddy | 0.73 | 7 |
| | | Pigeonpea | 1.44 | 14 |
| | Rabi | Groundnut | 0.12 | 1 |
| | | Paddy | 0.81 | 8 |
| | Total area (ha) | | 10.36 | 100 |
| Large | Kharif | Cowpea | 1.03 | 4 |
| | | Finger Millet | 0.10 | 0 |
| | | Groundnut | 10.29 | 42 |
| | | Horsegram | 4.44 | 18 |
| | | Paddy | 3.04 | 12 |
| | | Pigeonpea | 2.66 | 11 |
| | | Sorghum | 0.10 | 0 |
| | Rabi | Finger Millet | 0.20 | 1 |
| | | Groundnut | 0.61 | 2 |
| | | Maize Fodder | 0.20 | 1 |
| | | Paddy | 1.01 | 4 |
| | Perennial | Arecanut | 0.65 | 3 |
| | | Coconut | 0.16 | 1 |
| | Total area (ha) | | 24.48 | 100 |

**Appendix XXVIII: Cropping pattern of VDSA Farmers in Belladamadugu during 2010**

| Farm Size | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Avare | 0.04 | 1 |
| | | Chrysanthemum | 0.10 | 1 |
| | | Cowpea | 0.23 | 3 |
| | | Finger Millet | 0.51 | 7 |
| | | Groundnut | 3.21 | 47 |
| | | Horsegram | 0.14 | 2 |
| | | Paddy | 1.01 | 15 |
| | | Pigeonpea | 0.60 | 9 |
| | | Sorghum | 0.04 | 1 |
| | Rabi | Groundnut | 0.40 | 6 |
| | | Paddy | 0.61 | 9 |
| | Total area (ha) | | 6.88 | 100 |
| Small | Kharif | Avare | 0.11 | 1 |
| | | Castor | 0.02 | 0 |
| | | Chrysanthemum | 0.10 | 1 |
| | | Cowpea | 0.37 | 4 |
| | | Finger Millet | 0.71 | 8 |
| | | Groundnut | 4.21 | 48 |
| | | Horsegram | 0.16 | 2 |
| | | Maize | 0.30 | 3 |
| | | Maize Fodder | 0.20 | 2 |
| | | Paddy | 0.71 | 8 |
| | | Pigeonpea | 0.47 | 5 |
| | | Sorghum | 0.02 | 0 |
| | Rabi | Groundnut | 0.61 | 7 |
| | | Paddy | 0.71 | 8 |
| | Total area (ha) | | 8.70 | 100 |
| Medium | Kharif | Avare | 0.08 | 1 |
| | | Cowpea | 0.46 | 4 |
| | | Finger Millet | 0.51 | 4 |
| | | Groundnut | 6.47 | 56 |
| | | Horsegram | 0.32 | 3 |
| | | Paddy | 0.81 | 7 |
| | | Pigeonpea | 1.94 | 17 |
| | | Sorghum | 0.14 | 1 |
| | Rabi | Groundnut | 0.30 | 3 |
| | | Paddy | 0.61 | 5 |
| | Total area (ha) | | 11.63 | 100 |

Cont...

| Farm Size | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Avare | 0.10 | 0 |
| | | Cowpea | 1.05 | 4 |
| | | Finger Millet | 0.91 | 4 |
| | | Groundnut | 13.21 | 54 |
| | | Horsegram | 1.78 | 7 |
| | | Paddy | 2.23 | 9 |
| | | Pigeonpea | 1.71 | 7 |
| | | Sorghum | 0.15 | 1 |
| | Rabi | Chrysanthemum | 0.10 | 0 |
| | | Groundnut | 1.32 | 5 |
| | | Maize Fodder | 0.20 | 1 |
| | | Paddy | 1.01 | 4 |
| | Perennial | Arecanut | 0.49 | 2 |
| | | Coconut | 0.16 | 1 |
| | Total area (ha) | | 24.42 | 100 |

**Appendix IXXX: Cropping pattern of VDSA Farmers in Belladamadugu during 2011**

| Farmers group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Labour | Kharif | Avare | 0.08 | 1 |
| | | Chrysanthemum | 0.10 | 1 |
| | | Cowpea | 0.29 | 3 |
| | | Finger Millet | 0.93 | 11 |
| | | Greengram | 0.05 | 1 |
| | | Groundnut | 4.45 | 52 |
| | | Horsegram | 0.61 | 7 |
| | | Maize Fodder | 0.10 | 1 |
| | | Paddy | 0.61 | 7 |
| | | Pigeonpea | 0.49 | 6 |
| | | Sorghum | 0.20 | 2 |
| | Rabi | Chrysanthemum | 0.10 | 1 |
| | | Groundnut | 0.61 | 7 |
| | Total area (ha) | | 8.60 | 100 |
| Small | Kharif | Avare | 0.12 | 1 |
| | | Chrysanthemum | 0.20 | 2 |
| | | Cotton | 0.30 | 3 |
| | | Cowpea | 0.25 | 2 |
| | | D Lab Lab | 0.10 | 1 |
| | | Finger Millet | 0.56 | 5 |
| | | Groundnut | 4.21 | 39 |
| | | Horsegram | 0.32 | 3 |
| | | Maize | 0.40 | 4 |
| | | Marigold | 0.61 | 6 |
| | | Paddy | 1.42 | 13 |
| | | Pigeonpea | 0.52 | 5 |
| | | Sorghum | 0.20 | 2 |
| | Rabi | Groundnut | 0.61 | 6 |
| | | Maize Fodder | 1.01 | 9 |
| | Total area (ha) | | 10.82 | 100 |
| Medium | Kharif | Avare | 0.25 | 2 |
| | | Cotton | 0.20 | 2 |
| | | Cowpea | 0.31 | 3 |
| | | Finger Millet | 0.92 | 9 |
| | | Groundnut | 4.74 | 45 |
| | | Horsegram | 0.24 | 2 |
| | | Maize | 0.16 | 2 |
| | | Paddy | 1.38 | 13 |
| | | Pigeonpea | 0.39 | 4 |
| | | Sorghum | 0.68 | 7 |
| | Rabi | Groundnut | 0.71 | 7 |
| | | Maize Fodder | 0.26 | 3 |
| | | Paddy | 0.20 | 2 |
| | Total area (ha) | | 10.44 | 100 |

Cont…

| Farmers group | Season | Crops | Area | Percentage |
|---|---|---|---|---|
| Large | Kharif | Avare | 0.20 | 1 |
| | | Chrysanthemum | 0.20 | 1 |
| | | Cowpea | 0.71 | 4 |
| | | Finger Millet | 2.33 | 12 |
| | | Groundnut | 9.86 | 50 |
| | | Horsegram | 0.70 | 4 |
| | | Maize | 0.22 | 1 |
| | | Paddy | 1.82 | 9 |
| | | Pigeonpea | 1.21 | 6 |
| | | Sorghum | 0.25 | 1 |
| | Rabi | Chrysanthemum | 0.20 | 1 |
| | | Groundnut | 0.61 | 3 |
| | | Paddy | 0.40 | 2 |
| | Perennial | Arecanut | 0.77 | 4 |
| | | Coconut | 0.14 | 1 |
| | Total area (ha) | | 19.63 | 100 |

**Research Title:**

"Economic Analysis of Agricultural Transformation Process in Karnataka towards Inclusive Growth"

## Objectives

1. **To assess agricultural transformation and analyze the factors contributing such as crop pattern, enterprise combinations, technology, markets, institutions and analyze agricultural transformation process for inclusive growth.**

H-1. Access to technology, irrigation, infrastructure, markets, and adoption level determine the agricultural transformation process at micro and macro levels.

H-2. The agricultural transformation thus realized has inclusive growth.

H-3. Agricultural transformation lead to reduction in common lands, gomal lands, cropping pattern with some crops losing and some others gaining

**2. To analyze the sources of information and supply of new technology inputs and to estimate marketable surplus and the markets for output in different crops.**

H-4. Small and marginal farmers are relatively vibrant in accessing new technologies and inputs

H-5. Major source of information for farmers in the post green technology is Agricultural Universities followed by word of mouth, input dealers and mass media

**3. To estimate impact of Government policies and programs on poverty and development pathways.**

H-6. The benefits from developmental programs are not as accessible to small and marginal farmers as for large farmers due to procedural complexities, transaction costs, rent seeking and disinterest.

**4. To estimate how access to irrigation through water markets enhances the livelihood security of the rainfed farmers.**

H-7. Farmers with access to ground water markets have a greater livelihood security than farmers without access to ground water market.

**DEPARTMENT OF AGRICULTURAL ECONOMICS**

**UNIVERSITY OF AGRICULTURAL SCIENCES GKVK, BANGALORE-65**

**Schedule**

**Research Title: "Economic Analysis of Agricultural Transformation Process in Karnataka towards Inclusive Growth"**

Date of interview: Name of Interviewer: Basavaraj R. Jamakhandi

**1. General information**

2. Name of the farmer: Mobile phone No.
3. Age: Caste: SC/ST/OBC/Minority/ General (specify)
4. Education level (qualification):
5. Particulars of family: nuclear family / Joint family:
6. Name of the village: Taluk: District
7. Household details:

| Name | Relation with Head | Age | Education | Occupation | | Income from secondary occupation | Major Health expenditure since past decade (Rs.) |
|---|---|---|---|---|---|---|---|
| | | | | Primary | Secondary | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

8. Particulars of land holdings

Total land_______________acres,____________guntas

| Sl. No. | Type of land | Owned | | Leased in | | Leased out | |
|---|---|---|---|---|---|---|---|
| | | Area (Acres) | Market Value of land (Rs.) | Area (Acres) | Rent paid per season (Rs.) | Area (Acres) | Rent received per season (Rs.) |
| 1 | Dry land | | | | | | |
| 2 | Irrigated land | | | | | | |
| i | Well irrigated land | | | | | | |
| ii | Tank irrigated land | | | | | | |
| 3 | Current Fallow *(give reason for fallow) | | | | | | |
| 4 | Total | | | | | | |

*Give reasons for fallow (migration, labor shortage, alternative employment)

**9. Income from Animal husbandry: (Live stock)**

| Sl. No. | Type of animal | Nos. | Output (specify kgs …., litres of milk per day/animal…) | Price per kg/litre / specified unit | Cost involved in rearing/animal (per month or year etc) | Total income | Feed cost /day | Feed cost / year |
|---|---|---|---|---|---|---|---|---|
| 1 | Cow local | | | | | | | |
| 2 | Cow crossbred | | | | | | | |
| 3 | She buffalo | | | | | | | |
| 4 | Sheep | | | | | | | |
| 5 | Goat | | | | | | | |
| 6 | Poultry | | | | | | | |

**10. Farm inventory (**Farm machinery, equipments and other assets)

| Sl. No. | Particulars | Nos. | Current Value (Rs.) | Year of purchase | Value at purchase (Rs) | Income from custom hiring per year (if any) |
|---|---|---|---|---|---|---|
| 1 | Power tiller | | | | | |
| 2 | Tractor | | | | | |
| 3 | Irrigation pump (IP set) | | | | | |
| 4 | Vehicle (2 or 4 wheeler) | | | | | |
| 5 | Farm building | | | | | |
| 6 | Two wheelers | | | | | |
| 7 | Four wheelers | | | | | |

**11. Source of irrigation**

| Sl. No. | Source | Details of well | | | | | | | | | | | Yield of well (in inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year of drilling | Depth and Dia (feet) | Drilling cost | Casing cost | HP | Pumpset cost | Electrification cost | Pump Hrs per day? | | | Pump run days in a year 2012-13 | |
| | | | | | | | | | Kharif | Rabi | Summer | | |
| 1 | Open well/dug well | | | | | | | | | | | | |
| 2 | Bore well(s) | | | | | | | | | | | | |
| | 1 | | | | | | | | | | | | |
| | 2 | | | | | | | | | | | | |
| 3 | Irrigation tank | | | | | | | | | | | | |
| 4 | Purchased water | | | | | | | | | | | | |

**12. Repairs and maintenance (2012-13)**

| Particulars | Frequency | Reason for the problem | Amount spent on repair |
|---|---|---|---|
| Repairs to pump | | | |
| Replacement | | | |
| Repairs to panel board | | | |

**13. Non Farm/ off farm Income and Other income earning activities**

| Income earning activity | Volume of business – 2012-13 | Monthly net income | Net income per year |
|---|---|---|---|
| 1. Land leasing (acres)<br><br>2. Sale of groundwater (water market)<br><br>3. Money lending<br><br>4. Business<br>5. Building construction<br>6.Government/Non Govt/Pvt Services<br>4. Any other (specify) | 1. Leased in______acres<br>2. Only land Leased out ____acres<br>3. Land + well water leased out _____acres<br>Price of groundwater: Basis for Charging<br>1. @ Rs._____ per acre<br>2. @ Rs.___ per crop for ____,____crops<br>3. @ Rs. ___ per hr for _____hrs<br>4. @ Rs._____per irrigation<br><br>Income from<br>Rs.______________________<br>Rs.______________________<br>Rs.______________________<br>Rs.______________________<br>Rs.______________________ | Rs.___________ | Rs.________<br>Rs.________<br>Rs.________<br><br>____,_____,crops<br><br>Interest :Rs.__/mon |

**15. Area irrigated and well yield during 2012-13 (acres & guntas)**

| Particulars | Well no. | Well no. | Well no. | Well No. |
|---|---|---|---|---|
| 1. Water yield in / mattu per day or in inch in Kharif | | | | |
| 2. Net area irrigated in Kharif | | | | |
| 3. Water yield in mattu per day or in inch in Rabi | | | | |
| 4. Net area irrig in Rabi | | | | |
| 5. Wateryield in mattu per day in inch in Summer | | | | |
| 6. Net area irrigated in Summer | | | | |

**17. costs and returns from Crop enterprises on the farm for 2012 - 13**

| Items of expenditure in cost of cultivation | Season__________<br>Crop ___________<br>Variety_________<br>Area ___________ | | Season__________<br>Crop ___________<br>Variety__________<br>Area ___________ | | Season__________<br>Crop ___________<br>Variety__________<br>Area ____________ | |
|---|---|---|---|---|---|---|
| | Quantity | Value | Quantity | Value | Quantity | Value |
| (A) Water use efficiency on the farm | | | | | | |
| 1. Method of irrigation | | | | | | |
| 2. If well irrigated: Frequency of Irrigation once in every month | | | | | | |
| 3. If canal irrigated: Frequency of Irrigation once in every month | | | | | | |
| 4.No of months irrigated_____ | | | | | | |
| 5.Depth of water per irrigation -inches | | | | | | |
| 6. Hours to irrigate this crop area | | | | | | |
| 7. Pumping hours per day | | | | | | |
| **(B) COST PARTICULARS** | | | | | | |
| 1. Human labor for all operations (man days) | | | | | | |
| 2. Human labor for all operations (woman days) | | | | | | |
| 3. Bullock labor (bp days) | | | | | | |
| 4. Machine hours | | | | | | |
| 5. Seeds/ planting material | | | | | | |
| 6. Manure (cart loads) | | | | | | |
| 7. Fertilizer type (kgs) | | | | | | |
| Basal dose of Nitrogen | | | | | | |
| Basal dose of Phosphorous | | | | | | |
| Basal dose of Pottash | | | | | | |
| Basal dose of any other | | | | | | |
| Top dressing of N, P, K | | | | | | |
| 8. Plant protection chemicals (seed treatment) | | | | | | |
| ____________________ | | | | | | |
| ____________________ | | | | | | |
| 9. Bagging, transport(including Hamali), packing, marketing costs | | | | | | |
| 10. Main product (Kgs / qntls /tonnes / baskets | | | | | | |
| 11. Price of main product at which sold (Rs./qntls) | | | | | | |
| 12. Place sold | | | | | | |
| 12. By product (Kgs / qntls / tonnes / baskets) | | | | | | |
| 13. Price of byproduct | | | | | | |
| Intercrop name and output | | | | | | |
| Price intercrop | | | | | | |
| Wage rate (Rs/day) | | | | | | |
| **Retained for home consumption (Kg)** | | | | | | |

**30. Water sold /Water purchased for agriculture purpose**

| For which crop | Since which year | Season | Area irrigated | Duration of the crop | No. of hours to irrigate the area once | No. of irrigations given | Yield of well in inch | Time taken by the water to flow(mnts) (source to buyer) | Water conveyance structure | Mode of payment | How did you fix the price |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

**29**. **General information**

1. Land rent Rs/acre/year: Dry land ______, well irrig land ______ wet land _______

2. Wage rate Rs/day: human labor _________ 3. Bullock labor________

4. Private Interest rate ________

5. If the well water is sold Yes/No

   a. To whom the water is sold : Name of the buyer
   b. Is the buyer's land adjacent? If so, at what distance _____ meters
   c. How much water is sold? Volumetric______or land area irrigated___________ or Number of irrigations per crop_______
   d. Price per acre of land irrigated______ or Price per irrigation _______________

If price of water depends upon the crop: give cropwise price of irrigation:

**30. Types of water market.**

i. **Interlocked market:** If labour works on owners farm, owner will supply water……Volume ……….price

ii. **Investment on pipeline** without land………..leased land……….investment……..Volume……price

iii. ………….Volume of water exchanged for ……..quantity of **crop produced.**

iv. Based on per acre/hr/crop/labour exchange

**32. Contractual arrangements in water purchase / sale**

33. Type of arrangement and mode of payment

**a)crop share system**

| Crop | Season | Area irrigated | Crop output of buyer | Basis: Share(%) say ¼, or 1/3 or ½ etc or per hour or per acre or per gunta or per irrigation(specify) | Price at which crop was sold | Amount received by seller for ground water sold |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

**b) If per hour basis: Indicate how many hours, crop was irrigated of the buyer**

**c) If it is number of irrigations: how many irrigation were given and price per irrrigation**

**d) Other arrangements**

**34. How did you fix the price?**

**35. How do you monitor the water sale?**

**36. Relation between the buyer and seller**

1.Relatives

2.Friends

3.Neighbors

4.Belongs to same community

**37. a) Why are you selling /buying groundwater**

**b. Any burning problem of the area**

**42. Sources of Information for Farmers**

| Sl.No. | **Farmers name** | **Mobile** | **SAD** | **SAU** | **KVK** | **WM** | **PF** | **MM** | **ID** | **Subject** |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

SAD=State Agricultural Department, SAU=State Agricultural University, KVK=Krushi Vigyan Kendra, WM=Word of Mouth, PF=Progressive Farmers, MM=Mass Media and ID=Input Dealers

**40. Technology adoption**

| Crop | Variety used earlier | Variety cultivated at present | Why did you shift to the present variety | Source of information | Subsidy received if any | Major change/s between this variety and previous variety | Yield of previous variety | Yield of present variety | Price per quintal received for previous variety | Cost of cultivation of previous variety |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

**43. Details of all types of benefits from Participation in Developmental programs of the Government, Panchayath, TMC, Agri Dept, Horti Dept, Health Dept, Food and Civil Supplies**

| Name of the developmental program State / GOI / Panchayath / TMC program | Kind of Benefit Received | Through Which Department or institution program is implemented | Year of benefit availed | Total benefit or subsidy received (₹) | Transaction cost | | | Impact |
|---|---|---|---|---|---|---|---|---|
| | | | | | Time spent for obtaining benefit (hours-days) | Expenditure in obtaining benefit | Rents paid | |
| 1. Ration card | | | | | | | | |
| 2. BPL Card | | | | | | | | |
| 3. Kissan credit card | | | | | | | | |
| 4. MGNREGA | | | | | | | | |
| 5. SHG Loans and Subsidies | | | | | | | | |
| 6. PMRY | | | | | | | | |
| 7. SJSRY | | | | | | | | |
| 8. SGSRY | | | | | | | | |
| 9. RKVY | | | | | | | | |
| **10.Crop insurance schemes:** | | | | | | | | |
| 1. Comprehensive crop insurance scheme | | | | | | | | |
| 1. Experimental crop insurance scheme | | | | | | | | |
| 2. Rastriya krishi bhima yojana | | | | | | | | |
| **11.Pensions:** | | | | | | | | |
| 1. Indira Gandhi national old age pension | | | | | | | | |
| 2. Indira Gandhi national Widow pension | | | | | | | | |
| 3. Indira Gandhi national Disability pension schemes | | | | | | | | |
| 4. National family benefit scheme (do not ask, unless they volunteer to say) | | | | | | | | |
| 5. Family pension to disabled child | | | | | | | | |
| **12. Animal husbandry:** | | | | | | | | |
| 1.Fodder seed distribution and production | | | | | | | | |
| 2.Grass land dev.including grass reserves | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3.Poultry development | | | | | | | | |
| 4.Health coverage of sheep | | | | | | | | |
| 5.Subsidy scheme for sheep farming | | | | | | | | |
| 6.Subsidy scheme for supply of improved variety of ram | | | | | | | | |
| 7.Rinderpest surveillance & vaccination prog | | | | | | | | |
| 8.Est. of polyclinic of veterinary hospitals | | | | | | | | |
| 9.Supply of improved rams & pigs | | | | | | | | |
| 10. Kamadhenu insurance scheme | | | | | | | | |
| 11.Dairy entrepreneurship dev. scheme | | | | | | | | |
| 12.Insurance scheme to sheep & shepherd | | | | | | | | |
| **13.Housing schemes:** | | | | | | | | |
| 1.Indira Awas yojana | | | | | | | | |
| 2.Rajiv Gandhi rural housing | | | | | | | | |
| 3.ashraya | | | | | | | | |
| 4.Ambedkar rural housing | | | | | | | | |
| 5.Rajiv awas yojana | | | | | | | | |
| 6.Namma mane | | | | | | | | |
| 7.aasare | | | | | | | | |
| 8.Swarna jayanti shahari rojgar yojana | | | | | | | | |
| **14.Electricity:** | | | | | | | | |
| 1.Bhagyajothi | | | | | | | | |
| 2.Rajiv Gandhi grameen vidyutikarana yojana | | | | | | | | |
| 3.Jawaharlal nehru national solar mission | | | | | | | | |
| 4.Kutir jyoti scheme | | | | | | | | |
| 5.Nirantara jyoti scheme | | | | | | | | |
| **15.Drinking water & sanitation:** | | | | | | | | |
| 1. Ganga kalyana scheme | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2.Rajiv Gandhi national drinking water mission | | | | | | | | |
| 3.Energisation of drinking water supply scheme | | | | | | | | |
| 4.Janani suraksha yojana | | | | | | | | |
| 5.Rogi kalyana samithi | | | | | | | | |
| 6.Nirmal grama yojana | | | | | | | | |
| 7.Swacha grama yojana | | | | | | | | |
| 8.Jal samvardhana yojana sangha | | | | | | | | |
| **16.Health:** | | | | | | | | |
| 1. Yashaswini | | | | | | | | |
| 2. Arogya kavacha | | | | | | | | |
| 3. Vajapayee arogya shri | | | | | | | | |
| 4. Dhana lakshmi | | | | | | | | |
| 5. National rural health Mission | | | | | | | | |
| 6. Benefits for -Six killer diseases – triple antigen, polio, BCG, (TB), anti- malaria, anti dengu,… | | | | | | | | |
| 7. Benefits under family planning program | | | | | | | | |
| **17.Social welfare Dept schemes:** | | | | | | | | |
| 1. DWACRA | | | | | | | | |
| 2. Nava Chetana | | | | | | | | |
| 3. Fee Reimbursement | | | | | | | | |
| 4. Pre Metric Hostel | | | | | | | | |
| 5. Post metric hostel | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|
| 6. Residential school | | | | | | | | | |
| **18.Women and child development:** | | | | | | | | | |
| 1.Sandhya suraksha yojana | | | | | | | | | |
| 2.Midday meals schemes | | | | | | | | | |
| 3.Kaliyuva makkalige Free cycle | | | | | | | | | |
| 4.Ujjwala | | | | | | | | | |
| 5.Kishori shakti yojana (for 11-18 yr girl..) | | | | | | | | | |
| 6.Stree shakti | | | | | | | | | |
| 7.Santhwana (pregnant woman) | | | | | | | | | |
| 8.Swadhar | | | | | | | | | |
| 9.Karnataka mahila abhivrudhi yojane | | | | | | | | | |
| 10.Rastriya swasthya bhima yojana | | | | | | | | | |
| 11.Bhagyashree child welfare bhima yojana | | | | | | | | | |
| 12.Bhagyalakshmi | | | | | | | | | |
| 13.Navodaya schools | | | | | | | | | |
| 14.Rail pass | | | | | | | | | |
| 15.Fee consation | | | | | | | | | |
| 16.Women reservation claimed | | | | | | | | | |
| 17.caste reservation claimed | | | | | | | | | |
| 18.site from govt for women | | | | | | | | | |
| **19. Agri Dept** | Field Demonstrations | | | | | | | | |
| | Qty of Fertilizers purchased | | | | | | | | |
| | Subsidies for ….seeds | | | | | | | | |
| | ….farm machinery | | | | | | | | |
| | ….. biodigester | | | | | | | | |
| | …..vermicompost | | | | | | | | |
| | Drip Irrigation area, benef | | | | | | | | |
| | Sprinkler irrigation | | | | | | | | |
| | SACHETANA (fluoride free water supply in public..) | | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | BHOOCHETANA (minor elements Zn, Gypsum, Fe | | | | | | | | |
| 19a. | SAHAKARA SINDHU – 100%subsidy to buy land | | | | | | | | |
| 19b. | Training Programmes (ATMA) | | | | | | | | |
| 19c | Varadana scheme (Sericulture farming) | | | | | | | | |
| **20. Horticulture Dept** | Suvarna bhoomi yojana | | | | | | | | |
| | ..Mini kits | | | | | | | | |
| | ..NHM | | | | | | | | |
| | ..Community farm pond | | | | | | | | |
| | ..Floriculture | | | | | | | | |
| **21. Watershed dept** – Benefits like Farm pond, SEBs, Gully checks, vegetative gully checks, , nala bunds, check dam | | Organic farming | | | | | | | |
| 129. Sujala watershed project | | | | | | | | | |
| 130. Minor irrigation schemes | | | | | | | | | |
| **22.**Micro Entrp'ship (ME) Scheme. | | | | | | | | | |
| **23.**Urban wage employment program | | | | | | | | | |
| **24**. Enter'ship awareness program. | | | | | | | | | |
| **25**.Dev of Woman & child urban area | | | | | | | | | |
| 26.Self emp for urban poor | | | | | | | | | |
| 27. Details of all Trainings had | | | | | | | | | |
| 28.TMC Udyogini | | | | | | | | | |
| 29.Others | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

**141. Livestock:**

| Sl. No | Particulars | No. | Name of the program where you purchased | Your contribution (₹) | Subsidy | Transaction cost | | Income from livestock (₹) |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Time spent in getting the benefit / subsidy | Expenditure in obtaining benefit (including rent) | |
| 1. | Draught animals | | | | | | | |
| 2 | a.Local Cow | | | | | | | |
| | b.Buffaloes | | | | | | | |
| | c.Cross-bred cow | | | | | | | |
| 3. | Calves and Heifers (Below 1 year) | | | | | | | |
| 4. | Sheep | | | | | | | |
| 5 | Goat | | | | | | | |
| 6. | Poultry | | | | | | | |

**142. Farm Machinery, Implements and buildings:**

| Name of Machinery | No. | program or scheme under which you purchased | Your investment (equity) | Subsidy received | Transaction cost | | Rents paid | Annual income earned from the equipment including hiring activity |
|---|---|---|---|---|---|---|---|---|
| | | | | | Time spent to get the benefit under this program | Expenditure in obtaining benefit (for documents etc) | | |
| Tractor (…….hp ) | | | | | | | | |
| Power tiller (…hp) | | | | | | | | |
| Tractor accessories | | | | | | | | |
| Sprayer: | | | | | | | | |
| *Implements* -Bullock cart -Country plough -Other small implements | | | | | | | | |
| Others | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |

**143. Quantity of Fertilizers and agro chemicals:**

| Sl. No | Nutrient | Name of The fertilizer | Quantity Used | Price per Kg (`) | Total value (`) |
|---|---|---|---|---|---|
| 1 | Nitrogen(N) | | | | |
| 2 | $P_2O$ | | | | |
| 3 | $K_2O$ | | | | |
| 4 | Complex Fertilizers | | | | |
| 5 | Agrochemicals(PPCs) | | | | |
| 6 | | | | | |

**144. Perceptions of farmers regarding Benefits of Developmental programmes participated / received**

| Program/scheme which you benefited from | Upto what level you attempted | Why you did not receive the benefit | What are your suggestions to improve the reach |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |

**145. Perceptions of farmers regarding Benefits from programs not participated / received:**

| Program/scheme which you did not benefit from | Upto what level you attempted | Why you did not receive the benefit | What are your suggestions to improve the reach |
|---|---|---|---|
| 1 | | | |
| 2 | | | |
| 3 | | | |

1. Lack of awareness, ;2. No one helped me to get the benefit ; 3. Procedural complexity
4. cannot afford to pay huge rents ; 5. Inability to move and get work done; 6. Documents problem 7. Ineligible to receive the benefit 8. 9. Disinterested 10. Any other: hesitant to try and why

**146. Exposure to mass media /Govt Dept in the wake of challenges facing farming**

| Information obtained from | Name/s of paper / program / dept / sau/ exhibition/ friend | Type of information obtained (ag/ health/dev. Prog./general news/entertainment e.t.c.) | Time spent per day | Time spent in sharing with neighbors or friends |
|---|---|---|---|---|
| News paper | | | | |
| Radio | | | | |
| TV | | | | |
| Developmental department | | | | |
| SAUs | | | | |
| Exhibitions/krushimela | | | | |
| Friends/relatives | | | | |
| Mobile (using for agril purpose) | | | | |