FROM POLYVALENT TO MONOVALENT KNOWLEDGE IN AGRIUCLTURE: A SOCIAL CONSTRUCTIVIST ACCOUNT

A Thesis submitted during 2014 to the University of Hyderabad in partial fulfilment of the award of a Ph.D. degree in Sociology.

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DECLARATION

I, hereby declare that the research work embodied in the present dissertation entitled "**From polyvalent to monovalent knowledge in agriculture: a social constructivist account**" submitted by me under the guidance and supervision of Dr. C. Raghava Reddy is a bonafied research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodganga / INFLIBNET.

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CERTIFICATE

This to certify that the present dissertation entitled "**From polyvalent to monovalent knowledge in agriculture: a social constructivist account**" by submitted by Prasanth Kumar Munnangi. (09SSPH06) in partial fulfillment of the requirements for the award of Doctor of Philosophy in Sociology is a bonafied work carried out by him under my supervision and guidance which is a plagiarism free thesis.

The thesis has not been submitted previously in part or in full to this or any other university or Institution for the award of any degree or diploma.

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To

My Mama

Komaravalli Joseph

(there are no words to describe your help which helped me to grow in my life)

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(*PRASANTH KUMAR MUNNANGI)*

Abbreviations

GDP	: Gross Domestic Product
HYV	: High Yielding Variety
GR	: Green Revolution
BT	: Biotechnology
GATT	: General Agreement on Trade and Tariffs
IADP	: Intensive Agricultural Development Program
IAAP	: Intensive Agriculture Area Program
GM	: Genetically Modified
I K	: Indigenous Knowledge
ITK	: Indigenous Technical Knowledge
LK	: Local Knowledge
TK	: Traditional knowledge
TEK	: Traditional environmental knowledge
CSIR	: Council for Scientific and Industrial Research
ICAR	: Indian Council of Agricultural Research
ICMR	: Indian Council of Medical Research
OCs	: Other Castes
OBCs	: Other Backward Castes
SCs	: Scheduled Castes
STs	: Scheduled Tribes
MUPS	: Mandal Upper Primary School
SBI	: State Bank of India
VAO	: Village Administration Officer
TRS	: Telangana Rashtra Samithi
CPI	: Communist Party of India
INC	: Indian National Congress

TDP	: Telugu Desam Party
WTO	: World Trade Organization
KVKs	: Krishi Vigyan Kendras
CDP	: Community Development Program
NES	: National Extension Service
HYVP	: High Yielding Varieties Program
FTCs	: Farmers Training Centres
AES	: Agricultural Extension Service
A O	: Agricultural officer
A R	: Adarsha Rythu
AEOs	: Agricultural Extension Officers
SRI	: System of Rice Cultivation
SHGs	: Self Help Groups
RMG	: Rythu Mitra Groups
RRBs	: Regional Rural Banks
PSS	: Pragathi Seva Samithi
ICT	: Information and Communication
SMS	: Short Message Service
BMPs	: Best Management Practices
MNREGA	: Mahatma Gandhi National Rural Employment Guarantee Programme

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Chapter-I

Introduction

Agriculture, one of the oldest practices of human civilization, epitomizes man's relationship with nature. It encapsulates a set of technologies which manifest man's understanding of nature. Cultivation, as explained by Aristotle, 'is a practice that helps nature to produce more perfectly or abundantly things which she could produce herself' (Mitcham, 1978: 243). It was believed that 'in farming, although man performs all kinds of preparatory tasks, such as clearing, ploughing and sowing, nature itself has to do the rest. Once his preparatory tasks are done, man can only sit down and wait. It is the inner growing power of living nature which performs the work' (ibid: 243). However, over the years human beings evolved a set of practices which help them in manipulating the physiological features of crop growth thus limiting the rope of nature. These practices have co--evolved on the basis of cumulative knowledge.

Agriculture is defined as an art of cultivating soil, producing crops and raising livestock. It can also be defined as the systematic and controlled use of living organisms and the environment to improve the human condition. Agriculture is a key sector in most developing countries. The economic growth of third world countries wholly depends on the development of agricultural sector. Agriculture has played, and will continue to play a major role in the efforts of India's long-standing poverty. More than one-third of the rural population still lives in grinding poverty. To achieve self-reliance, growth, equity, and to reduce poverty and to achieve overall development of the country, developing countries introduce modern technology in agriculture (Roy, S. 1990; Sulaiman and G Holt 2005). Agriculture has been a way of social organization and it is closely connected with the greater part of individuals' life in rural areas. Agriculture has been an integral part of the

traditional culture in Asia, and particularly in India, where farming was a self-contained one for a long time. AR Vasavi in her book "*Shadow Space"* suggests that 'Agriculture has been the anchor for achieving socioeconomic growth, it is perhaps more important as governing a way of life and forms of organization and patterns of value.' Indian rural life is completely identified with agriculture and activities that supported agriculture where it is embedded in the iniquitous caste system' (Vasavi, 2012).

Indian farming is predominantly traditional in the sense that it follows practices which are intuitive and passed on through generations. India, the second most populous and the seventh largest country in the world, has more than half a billion of its people depending on agriculture as a source of livelihood. Also, agriculture has been the backbone of India's economy as it has been contributing significantly to the Gross Domestic Product (GDP) of the country. According to the 2011 census, 57 percent of India's population is dependent on agriculture and its allied activities for their livelihood. Agriculture has been the primary occupation of a majority of Indian people in rural areas. India's agriculture had long been associated with a diversity that resulted from a combination of a wide variety of agro-ecological zones and a plurality of cultures. There are varied and identifiable regional agricultural complexes in which each region had its own cultivation patterns, knowledge systems associated with them, and socioeconomic relations and political structures. Ludden (1985) notes that historically 'each agriculture zone has its own style of life, for farming routines and material conditions dominated human experience'.

The agricultural situation during the British colonial rule witnessed the neglect of the agricultural sector. After independence, since the inception of National Economic Planning in India in 1951, sustained efforts have been made by the planners to accelerate the pace of agricultural development. It was only in the mid-

Sixties, when the economy suffered a major setback on account of two consecutive years of drought, that a shift in the development strategy focusing on rapid agricultural development became necessary. For decades Indian agriculture continued to be traditional in character. Indian agriculture has been witnessing low yields, limited income, and lack of capital to invest and has been a prey to the unpredictable monsoon. Climatic factors like rainfall and long dry spells during monsoon season have shown a drastic impact on the yield variability.

During 1960's a new strategy of agricultural development, focusing on modernization of agriculture and improvement in farm productivity was launched. This strategy for modernization of agriculture, widely referred to as 'green revolution', has been pursued vigorously in Indian agriculture since 1967. As part of the green revolution, the state adopted the policy of providing a wide range of incentives to farmers in the form of specific subsidies on modern agricultural inputs. Thus, subsidies have been provided to farmers to encourage the use of chemical fertilizers, develop irrigation facilities, electricity and also to avail credit facilities.

Consequently, India witnessed a green revolution, which paved way for High Yielding Variety (HYV) seeds, assured irrigation, usage of chemical fertilizers and mechanization. The objective of green revolution was to increase food production and to promote the adoption of improved farm practices by providing credit, seeds, fertilizers, pesticides and machinery. The main focus was to transfer institutionalized knowledge to farmers through extension system and by using the external inputs efficiently in the form of improved seeds, chemical fertilizers, chemical pesticides, irrigation, farm machinery, etc. Green revolution is aimed not only at extending agricultural production, but also improving the income of the poor agricultural workers by increasing wage days. 'Number of schemes were formulated specifically for the development of agriculture to maximize production to achieve agricultural growth in order to eradicate poverty and hunger' (Mellor, 1976). Green revolution

is also seen as a significant technological breakthrough in agriculture, which enabled nation-states to regain sovereignty. Green revolution became the dominant orientation for rural development programs in India since mid-1960s.

Understanding the changes ushered by green revolution cannot just be limited to the social consequences of green revolution. But what could be significant from the social constructivist point of view is understanding the changes in the technological frame that influenced the orientation and world view of the farmers towards the role of inputs suggested under the garb of scientific and advanced methods in the cultivation like improved seeds, chemical fertilizers, irrigation water management, chemical pest and disease control and mechanized tools. Although not directly linked to green revolution technology, the shift from food crops to non-food crops could also be attributed to the epistemological bias of green revolution which equated farm to factory.

Today inputs such as fertilizers, pesticides, mechanical power and seeds occupy a prominent place in the input structure because they are seen as a means of high yields. The goals were set in terms of tangible outputs leaving anything beyond as untenable. Consequently, we witness a large scale displacement of traditional inputs like organic manure, animal power and farm-retained seeds, which are branded as low yielding. In the present-day agriculture, the cost of inputs contributes to a large share of expenditure pressurizing farmers to increase yields by any means.

Input intensive cultivation is reported to be counterproductive in the small and marginal holdings as there has been a steep increase in indebtedness. At the same time there has been an erosion of localized, heterogeneous forms of knowledge in agriculture with the promotion of input intensive modern agriculture. The promotion of modern technology, capital and external knowledge intensive agriculture and cultivation of commercial crops, in fact, suited the interests of

corporate agri-business groups. The new regime of commercial agriculture caused distress and loss of livelihood for many small and marginal farmers. Thus, it is argued that green revolution based technology has brought about a convergence of interests of powerful groups formed by the rural elite at the local level, and the industrial elite at the national level.

Green revolution has succeeded in producing enough food for the country, but there are dramatic failures at farm levels. Certain farming systems became vulnerable not just because of lack of economic resources, but owing to lack of knowledge about the usage of inputs. The technology-knowledge gap, and the gap between farmers and knowledge sources has widened like never before. It is well known that HYV seeds are more vulnerable to pests and diseases than local traditional varieties of seeds. Therefore the usage of appropriate pesticides and fungicides became inevitable. However, unfortunately such knowledge is either not available or available in the corrupt form. In fact, the suicides witnessed among cotton farmers reported to be due to the pest damage despite several rounds of pesticide application. The legitimacy of the argument in favor of Bt cotton in fact lies in the failure of pest control in cotton.

Prajapati and others (2014) suggest that agriculture is moving to a knowledge intensive mode of cultivation. They suggest that the transition in agriculture occurred in three stages. The traditional agriculture characterized by subsistence farming, transcended to preliminary modern agriculture. The preliminary modern agriculture was basically a market-oriented agriculture. This led to an advanced modern agriculture, which is said to be knowledge-oriented agriculture.

Traditionally, agricultural knowledge and practices in India are shared among the community of farmers and passed down to the next generations through social and cultural practices. Such knowledge was local specific, communitarian,

open and embedded in the culture specific to the region. Knowledge was local specific in the sense that cumulative knowledge was developed based on trial and errors of farmers in that region. It addressed the concerns of farmers with respect to suitable seeds, methods of cultivation, pests and diseases, etc. It was communitarian because it evolved through the collective enterprise of farmers. Such knowledge was available to all the farmers of the region either directly or indirectly. The local knowledge was also embedded in culture as many practices of cultivation were closely intertwined with religious, cultural, ethical dispositions of the farming community of the region. Although quipped for the stagnation of agriculture for a long period, the local knowledge must also be credited for the sync it achieved with the environment of the region.

Hamilton (1958) argues that, earlier, farmers used to cultivate for subsistence. Over a period of time, commercialization has taken place as farmers started to produce for the market and for profits. In a traditional society, farmers cultivate conventional crops, according to their will. Over a period, globalization and commercialization gained its prominence by the introduction of green revolution. Introduction of green revolution technology has attracted many small and marginal farmers who began cultivating for a market rather than for subsistence. The new technology made farmers perpetually dependent on the market for inputs like seeds, fertilizers and pesticides, and perform the agricultural activates according to the directives given by the external knowledge sources.

Historically, the local agricultural practices, which were drawn from a shared repository of knowledge, were transferred within the region and were replicated and advanced. The knowledge system that evolved in tune with nature – soil, living organisms, crops, water usage, etc., over centuries has been rendered irrelevant as external input intensive agriculture has crept into the technological frame of farmers. Crop rotation, intercropping, trap crops, use of cattle for agricultural and related

operations, have become obsolete as they don't seem to be augmenting yield directly. As scientific knowledge in agriculture, evolved in the research stations being privileged and transferred in the form of best management practices, the regional and local specificities of crop production have been given a go by leading to the maladies in agriculture.

In the context of increasing commercialization of agriculture, the intensity of competition among agribusiness players and the growing distance of state extension services has meant that agricultural practices are increasingly dictated by market-led forces. The result is intense competition among farmers to compete with each other by more and more usage of inputs. Such absorption and adaptation of fads, while displacing their own local knowledge systems, has also led to increasing 'agricultural deskilling' (Stone, G. 2007), which is the inability to use appropriate and relevant knowledge and practices. Although the new agricultural model is promoted, there is little or no systematic dissemination of information, knowledge and training delivered to farmers.

Nanda (1995) argues that after liberalization Indian agriculture is treated as a major source of increasing export earnings rather than as a source of subsistence. New agricultural policy concentrated on the export led development and accumulation of capital and profit making. Green revolution based agricultural policies intensified external science and technology driven models facilitating the entry of corporate groups into the agricultural sector.

The General Agreement on Trade and Tariffs (GATT), which brought agriculture into World Trade fold, was made for 'survival of the collapsing capitalist system'. This is because, unlike, the industrial sector agriculture is the only sector which does not face any recession. Cautioning us about it two decades ago Vandana Shiva (1991) observed that 'when the multinational companies start controlling the

seed they control the farmer and gradually they control the food grain trade. And once multinational companies control food grain trade it means they control the nation'.

Scientific knowledge in agriculture

Until the advent of science of crop production, farming progressed by imitation. Improvements in practices of crop cultivation were isolated random accidental improvisations which spread through word of mouth and established as practices. The occurrence of these accidental inventions and innovations in agriculture were sporadic and spatial and communities worked hard on the adaptation and adoption. These improvisations added to the cumulative knowledge in agriculture and were passed on from generation to generation. However, the knowledge of cultivation has been transformed with the emergence of scientific understanding of crop physiology, soil, and nature's role in food production. Modern science through its principles evolved certain standard practices which proved to be advantageous than the practices hitherto used by farmers. Thus, over a period, community knowledge has been replaced by scientific knowledge and science began to guide crop production. The examples of hybrids of yester years and genetic engineering of today showcase the scientific advancement in agriculture. At the same time, scientific knowledge in agriculture evolved into a discipline of its own handling the tasks of production and problems of crop cultivation.

Studies on the social consequences of green revolution claim that the seed-fertilizer-irrigation intensive strategy of crop production paved way for capitalist transformation of Indian agriculture through industrial products such as chemical fertilizers, synthetic insecticides and herbicides. Large farmers, endowed with financial resources and access to agricultural information benefited with green revolution while the small and marginal farmers lost out to the wild market forces.

The high-cost and high-yield green revolution technology, particularly in cereal crop cultivation, forced unsustainable capital investments, beyond the means of a majority of small and marginal farmers pushing a large section of small, marginal and tenant farmers into debt trap. Dhanagare (1987) observes that, owing to the capitalist penetration of the countryside, the process of de-peasantisation has been accelerated and consequently a large number of small and marginal farmers or poor peasants have been pushed to the ranks of landless labourers. Green revolution technology changed the production and productivity in the irrigation areas, but it neither benefited the non-irrigated regions nor addressed the problems related to farming in the dry regions (Joshi, 1999).

Agarwal (1981) points out that 'the fruits of green revolution technology have been pocketed mainly by big farmers and the disparity between the rich and the poor has further increased'. The intensive cultivation practice of green revolution demands high labour use which only the affluent farmers can afford (Ladejinsky, 1973). D K Gill and S K Saini (1991) report that the benefits of capital intensive green revolution were differentially distributed across the rich and poor farmers owing to the economic inequalities. The rich farmers could reap benefits while the poor farmers benefited only marginally because of their incapacity to afford to adopt new technology. In some cases the 'trinity' of green revolution- chemical fertilisers, pesticides and hybrid seeds - brought the majority of peasants both into indebtedness and into dependence on multi-nationals.

Background to the Study

For centuries agriculture is a way of life, a tradition which has shaped the culture and the economic life of the people of India. The government policies regarding agriculture have influenced the villages and its economy. Introduction of green revolution technology during the 1960s, though confined only to some pockets of India, was an important turning point in the development history of modern India. Byres (1981) observe that before green revolution agriculture was based on indigenous knowledge where farmers used to grow traditional crops with traditional knowledge, but green revolution turned agriculture into 'knowledge based farming', as the new technology demands appropriate knowledge levels to achieve desired productivity and efficiency.

Concurring with these observations, Gupta (1998) also notes that over a period traditional farming transformed into knowledge intensive modern farming. Increasing number of small and marginal farmers and the spread of knowledge intensive modern farming placed new demands on the ways of disseminating agricultural information. Need for personalized, interactive communication system to address farmer's specific problems arose. Also that, farmers, particularly marginal and small farmers who have newly entered into agricultural sector lack knowledge about new agricultural practices and are unaware of making 'choices' (Vasavi, 2012). Farmers' aspiration for upward mobility and the need to raise their income levels may be considered as another factor pushing farmers to adopt new agricultural technologies, new crops without adequate knowledge. As a result, the intensity of risk is increasing. The risk is inversely placed with the extent of land holding. In traditional agriculture, collective decision making at the community level insulated risks to a greater extent (Omvedt, 1991).

Agriculture in India is undergoing radical changes in the post liberalization era owing to multiple factors. With the launching of economic reforms based on neo-liberal agenda, the practice of cultivation became knowledge intensive, commercialized, competitive and globalized. Structurally today's agriculture is dominated by small and marginal farmers operating small holdings (see Fig 1 and 2). These sections of farmers present characteristics which cannot be explained in terms of classical diffusion of innovations approach. Vasavi (2012) maintains that these sections of farmers are caught by the 'web of risks' such as low risk taking ability, lack of required technical knowledge, lack of access to working capital and marketing networks, low investment, low productivity, weak market orientation. Also, these sections of farmers are new entrants into cultivation.

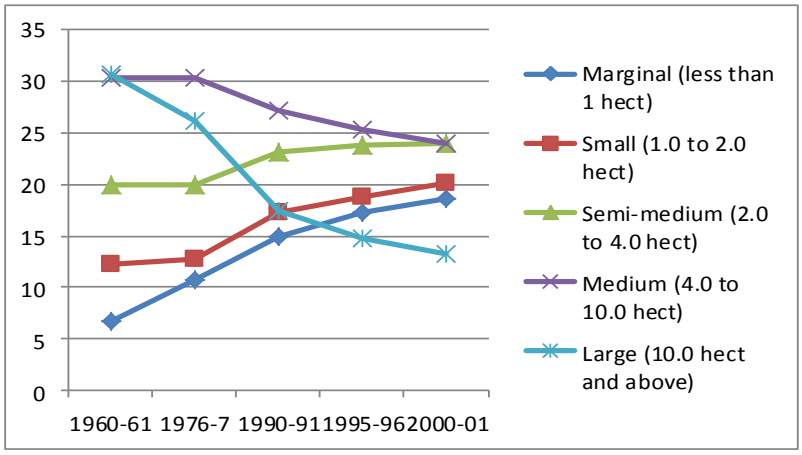


Fig. 1. 1: Trend in the land holdings in India between 1960-61 and 2000-01

Source: *Oxford Hand Book of Indian Sociology*: *New Delhi*, 2004

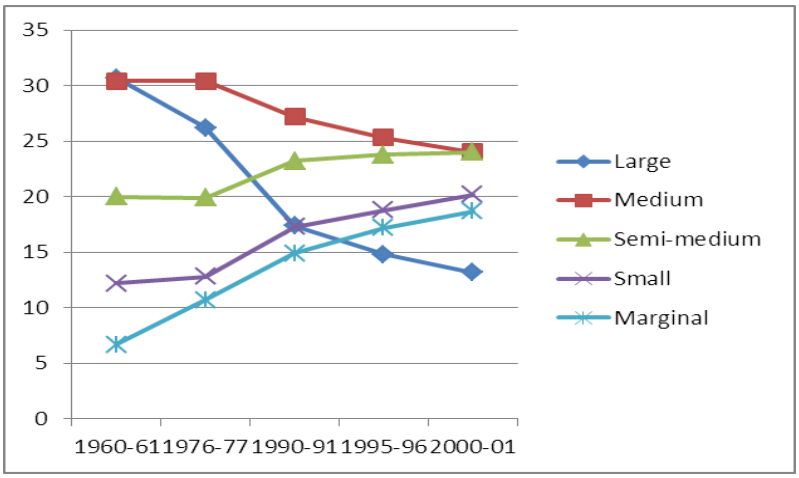


Fig. 1. 2: Trend in the area operated in India between 1960-61 and 2000-01

Source: *Oxford Hand Book of Indian Sociology*: *New Delhi*, 2004.

They enter into cultivation as Indian agriculture is on the threshold of second green revolution. Lured by the prospects of making money through commercial cultivation these sections of farmers have entered into cultivation in the recent past. Their disposition towards cultivation, and elements of cultivation like soil, water, seed, etc. are different from that of the farmers who have already been there in the cultivation since a long time. Thus, it may be said that young farmers who have entered into cultivation in the last one to one-and-half decade have different technological frame than that of the farmers who have been there since three to four decades.

Asides it is also important to note that the agricultural practices promoted by market forces and multi-national companies are leading to 'Taylorisation of agriculture'. Farmers' aspiration for upward mobility through high yields is resulting in the adoption of the so called modern scientific practices without a proper understanding. It may be observed that farmers have been shifting to crops that fetch them quick returns, for example the rise in the area under cotton and other

commercial crops across the country. As a result, the traditional knowledge that was inclusive of all the elements of cultivation i.e. soil, environment, biological organisms, cattle and farmers in a holistic manner is increasingly being replaced by knowledge that aims yield and productivity only.

Understanding of society and technology interface is influenced two dominant modes of thought. The predominant view of this interface is the technological deterministic perspective. The technological deterministic perspective emphasises the impact of technology on society. It aims at examining the social change as a result of the introduction of a new technology. It assumes that technologies follow trajectories of development whose logic is innate and not tied to social and cultural factors; and that technology's impact or influence on society is unidirectional. The basic limitation of this perspective is that it views technology as a black-box. The technological determinists seldom question the nature and design of technology for the reason that they view technology as given, apolitical and asocial. Objecting to this view emerged the alternative view on society- technology interface, which is known as social shaping of technology perspective. The social shaping of technology perspective suggests that technological systems emerge out of choices between social groups engaged in technology development and thus technology is socially constructed. The systems approach which focuses on technologists as 'systems builders; and postulates that heterogeneous people, disciplines and organizations form a part of 'seam less web' (Hughes, 1992) and the actor- network theory which gives a comprehensive approach to understand the development of technology focusing on the relations between actors of technical and non-technical world. Raymond Williams views that technologies are created not by lone inventors or geniuses working in a social vacuum, but by a combination of social forces and processes (as quoted in Mackay & Gillespie, 1992).

Polyvalent knowledge, as used by Etzkowitz and Riccardo Viale (2010), refers to the emerging nature of knowledge that results from the interplay of theoretical, practical and interdisciplinary implications forming a common center of gravity. The thesis adopts the concept polyvalent knowledge in the present study. It is used to denote the knowledge that considers different elements of cultivation, namely, farmers, soil, climate, biological organisms, cattle, etc in a holistic manner. It argues that traditional knowledge was polyvalent as it placed all the elements of cultivation in an equilibrium and in sync with the local specificities of nature. The opposite of this term is monovalent knowledge that emphasises one implication, i.e. yield. It is argued that the emerging nature of knowledge in agriculture, emanating from the institutions of sciences, emphasises on yield/ productivity ignoring all other elements of cultivation. This knowledge is privileged over the traditional/indigenous knowledge in the name of efficiency. Such knowledge is being made available to farmers in the village by formal means of agricultural extension i.e. state department of agriculture and the agricultural scientific community, and informal sources of agricultural communication i.e. input dealers, progressive farmers, etc. As a result of the privileged position of monovalent knowledge polyvalent knowledge is getting obscured and is on the verge of extinction.

Hypotheses

The thesis proceeds with the assumption that cultivation practices, knowledge associated with such practices and the technological frame within which farmers make choices are undergoing changes. The reasons for such change are traced to the early green revolution phase, present phase of green revolution, and post liberalization period. The specific hypotheses the thesis attempts to explore are:

- Agricultural knowledge is increasingly becoming monovalent
- Factors contributing to monovalent knowledge are located in the technological frame of farmers.
- Traditional knowledge has been polyvalent whereas modern scientific knowledge reaching farmers is monovalent.

Objectives

Practices of cultivation evolved over centuries through certain principles drawn based on empirical testing and standardization. Practices undergo changes because of various factors, including the spread of knowledge of cultivation from sources outside the village. Social, economic and political factors influence cultivation practices. However, the influence is varied. The variations are based not only on size of land holding, caste, but also the disposition of farmer towards cultivation. Apart from the individual factors, social and cognitive factors influence the practice of cultivation. The thesis argues that farmers take up cultivation practices based on the technological frame that prevails in the village context.

Bijker (1995) suggests that technological frame is better understood as a 'frame with respect to technology'. Technological frame is the shared cognitive frame that defines members' common interpretation of an artifact. A technological frame can include goals, key problems, current theories, rules of thumb, testing

procedures, and exemplary artifacts that, tacitly or explicitly, structure group members' thinking, problem solving, strategy formation, and design activities (Bijker 1995, 125). A technological frame may promote certain actions and discourage others. The present thesis uses the concept of technological frame as the one that guides actions, and thinking of farmers vis-a-vis cultivation, and that provides rationality for certain actions, and goals. It also structures group thinking, i.e. farmers' thinking on cultivation. Using the social constructivist (MacKenzie and Wajcman 1999) approach it attempts to understand the technological frame that guides the cultivation practices in the study village. Constructivist account helps us to understand the values and standards which evolve into technological frame and have a bearing on farmers within the village context. The specific objectives of the study are:

- To understand farmers' disposition towards cultivation through an analysis of cultivation practices.
- To explain the reasons for changes in the nature and forms of farmers' knowledge in cultivation.
- To describe the emerging nature of cultivation, which is characterized by change and explain the reasons for the continuity of certain practices.

Plan of Thesis

The thesis consists of six chapters.

The first chapter provides an introduction to the study by delineating agriculture in general, the changes in cultivation, the emerging nature of agriculture in the contemporary context and the objectives of the study. Second chapter describes the contemporary agricultural scenario and the changing forms of agricultural knowledge among farmers. It also describes the methodology adopted in the present

study. In the third chapter, village profile is presented covering demographic, social, economic, political and religious aspects of farmers. This is necessary to know the village in its totality for a better appreciation of the problem at hand. The Fourth chapter deals with the sources of agricultural information available to farmers in the study village. It also attempts to capture the nature of emerging sources of knowledge related to cultivation. Fifth chapter describes the cultivation practices adopted by different set of farmers and analyses the reasons behind such practices based on the explanations offered by the respondents. It attempts to bring out change and continuity of knowledge forms among farmers and ascertains its nature, patterns and directions. The final chapter summarizes the findings of the study along with a discussion on the possibilities of evolving an analytical framework for understanding agricultural knowledge from the sociology of scientific knowledge perspective. This discussion is grounded in the contemporary agricultural situation of the country.

Chapter-II

Review of Literature and Methodology

One of the important fields of academic engagement of social science in India after independence is agriculture. It is not just due to the fact that agriculture has been the option for livelihood for the majority of people in the country, but also because of the fact that agriculture in India has been undergoing significant and substantial changes in the last two decades. Knowledge of crop production that remained stagnant for more than centuries has undergone several changes after independence and more drastic changes in the last two decades. These changes are not just significant from an economic point of view as productivity level reached new heights in various crops, but also from a sociological point of view as the foundations of social structure have been thoroughly shaken. Social scientists have been attempting to understand these changes and have been highlighting the implications of such changes from time to time. The present chapter provides a review of literature in the first part and the methodology adopted in the study in the latter part.

Section-A: Review of Literature

Agricultural progress manifests development of a country and its economy. A progressive agriculture is an influential factor of economic growth of the country. It helps in initiating and supporting the development of other sectors of the economy by providing necessary capital, labor, raw material, goods and foreign exchange. In view of this, after independence, India made tremendous efforts to boost the economy through agricultural development. The Government of India adopted a positive and a well-defined policy of the integrated production program with definite targets along with other measures for the overall economic development of the country. Specifically, agriculture was given a major thrust to convert it into an

economically viable livelihood option for the rural poor by bringing more land under cultivation and raising productivity through adoption of modern technologies suggested in the form of green revolution in the late sixties.

Green revolution

After independence, India faced a serious food grain shortage not just due to regular droughts, but because of the fact that the population growth outpaced food production. The need of the hour at that time for the state was to increase agricultural production to save the country from the gravest crisis it faced after Independence. The agenda for the state was to achieve food grain self- sufficiency and food security. It embarked on the new agricultural strategy known as green revolution. Green revolution consists of use of improved seeds, modern farm machinery such as tractors, harvesters, threshers, etc., chemical fertilizers and pesticides in an optimal combination with assured irrigation. The name 'green revolution' is given to the technology associated with the new seeds in terms of a package of agricultural inputs and new practices. Large scale application of modern science and technology in agriculture, with an aim to improve productivity, was the motive of green revolution. Extensive and intensive use of improved production technologies and high yielding varieties (HYV) of seeds has been the essence of the green revolution (CSSC, 1974). One of the important characters of HYV seeds is that they are more responsive to chemical fertilizers which results in higher yields per unit of fertilizer. Sometimes they can give two to four times of the yields of the indigenous varieties. These seeds have shorter maturing period which allow farmers for double cropping. The term HYV was not a scientific one, but it was catchy and remains in use even today.

Green revolution stood for a substantial increase in agricultural productivity with the help of new technologies in a shorter period of time. Green revolution

ushered in drastic changes in agricultural practices resulting in a shift from traditional way of cultivation to modern methods based on scientific observations and explanations on crop, soil, etc. It also brought changes in the social organization of production as it emphasised the usage of machinery in cultivation. The new farm technology consisting of seeds developed in research stations in agricultural universities and institutions, chemical fertilizers, adequate irrigation facilities, pesticides etc., and their proper combination stand for green revolution paradigm.

Intensive Agricultural Development Program (IADP) was one of the first major initiatives in agriculture launched in the country in 1961 followed by the Intensive Agriculture Area Program (IAAP) launched during 1964-65 with a focus on areas with the greatest potential for improving agricultural productivity, which provided a ready platform to disseminate green revolution. It was intended to release Indian agriculture from the 'shackles of the past' through the introduction of modern intensive chemical farming (Shiva, 1991).

The earlier attempts aimed at increasing food production using traditional varieties were replaced by the HYV seeds. The rapid implementation of the green revolution technology can be gauged from the fact that the area under HYV seed gone up by more than 35 times, from 2.2 million hectares in 1966-67 to about 72 million hectares in 1992-93 (Joshi, 1999). The area under irrigation has increased from 22.6 million hectares in the pre-plan period to about 85 million hectares at the end of 1993-94 consisting 31.8 million irrigation projects. The consumption of chemical fertilizers, which was only 0.13 million tonnes in 1955-56 increased to 12.4 million tonnes in 1993-94. Green revolution enabled the country to convert the nightmarish 'begging bowl' status to that of 'self-sufficiency'. Jodhka (2006) observes that, 'green revolution was first introduced in Punjab, it has also matured here before it did in other places in the country and it raised the productivity of land

by several folds. It also changed the rural social structure and had a direct bearing on the nature of local and regional politics'.

According to Dhanagare (1987) green revolution is a package, involving both ideology and practice, of 'large scale application of modern science and technology to agriculture' and hence green revolution has to be understood as a broader ideology of rural transformation. Green revolution offers some compelling and vital information about technological change in general and technology transfer in particular. It shows that technology is a system of knowledge shaped by humans and that technology can overcome cultural obstacles, provided necessary institutional changes are initiated.

The onset of green revolution resulted in changes in the knowledge base of the farmers. The technological change as experienced in the wake of the green revolution were use of high yielding variety seeds, chemical fertilizers, pesticides and better water management practices. These changes have led to a marked increase in the output per acre (Shah and Singh, 1970). Oommen, T. K. (1971) observes that the agrarian unrest and the economic disparity believed to have resulted from the green revolution. Similarly Ladejinsky (1973) points out that the greater the green revolution resulted in the increasing disparity between the rich and poor leading to agrarian tension. The package was biased against small and landless farmers. Many studies have shown that green revolution has widened the gap between the rich and poor and increased the social and economic inequalities.

It is believed that, new agricultural technologies often lead to alterations in social relations of production and in the nature of work in the cultivation process. Shiva (1992) argues that it is not merely a technological innovation, chosen for increasing productivity and bringing prosperity to the farmers, as its damaging consequences far exceeded its benefits. Shiva (1992) contends that, 'green

revolution is the name given to this science-based transformation of Third World agriculture, and the Indian Punjab was its most celebrated success. Paradoxically, after two decades of the green revolution, Punjab is neither land of prosperity, nor peace. It is a region riddled with discontent and violence'.

With the adoption of new agricultural technology, there has been a change in agricultural practices, farm management and its approaches. It is opined that though green revolution increased the demand for labour, wage rates have not raised, as the supply of labour was quite elastic. It is also observed that the medium and large farmers have intensified agriculture by adopting double and multiple cropping. Double cropping should have actually led to increased wage days. However, mechanization of agriculture has taken away the wage days.

Green revolution and its impact on cultivation

As a result of intensification of cultivation, Indian agriculture has seen changes in the cultivation patterns from traditionally predominant subsistence farming to market oriented production. Crop cultivation tools and equipment also have changed after the introduction of green revolution. Usage of tractors, seed drills, and other machinery increased significantly after the introduction of the green revolution. Green revolution also opened doors to changing of cultivation patterns from traditional forms to modern or scientific forms resulting in the rise new knowledge elites in rural areas.

Changes in the cultivation practices have also taken place in the input use, source and organization of production. It is mainly attributed to the spread of modern technology and the relative advantage of different inputs. Inputs such as fertilizers, insecticides, and improved seeds occupy a prominent place in the input structure. They have substituted organic manure, biological control of plants and diseases and farm retained seeds. Traditionally, Indian farmers have been employing methods of

organic husbandry, the knowledge of which evolved over centuries. The practices of crop rotation and leaving the fields fallow for long periods of time allowed the soil to retain nutrients and rejuvenate the growth of microorganism. The demands on the land were low, allowing farmers to establish a stable relationship with environment. Maintaining a state of equilibrium with soil enables farms to recover after disastrous events, such as droughts or floods (Das, 2009). However, this has completely changed with the introduction of green revolution based modern crop science practices, which focus on profit making through surplus production.

Cropping pattern refers to the types of crops cultivated and their extent of area under cultivation in a particular area at a particular point of time. Change in cropping pattern in a particular span of time indicates the changes that have taken place in agriculture. These changes are brought about by socio-economic, political and technological and ethical factors operating in the region. In most of the situations, the physical environment reduces the choice of certain crops altogether or reduces their extent of cultivation (Morgan and Munton, 1971). To maximize profits, farmers adopted new crops and compromised the sustainable development practices in return. The earlier practice of inter-cropping has been increasingly replaced by single crop cultivation based on the new improved seeds and assured irrigation. An important result of this shift in cropping pattern was greater dependence on irrigation. Abbi and Singh (1997) contend that major political fallout of this is the sharpening of inter-state disputes over the distribution of river water and rising discontentment among farming communities.

Changes in agriculture after the introduction of green revolution has diverse effects on the different sections of farming communities in India. The primitive subsistent and traditional mode of cultivation has become capitalistic focusing on production for market. In the market economic system farmers have turned into managers of the physical process of agriculture, because the manual operations have

been almost mechanized and the remaining tasks have been done by the migratory labour available at low level of wages (Gill and Singh, 2006).

Suri (2006) in his study on farmer's suicides in India observes that there were 8,900 suicides by farmers between 2001 and 2006 in the four states of Andhra Pradesh, Karnataka, Kerala and Maharashtra. He observes that several operational and social factors are accountable for farmer's suicides in the country. The small landholdings, changing cropping pattern due to a shift from food crops to cash crops, liberalization policies which pushed Indian agriculture into the global market, rising costs of cultivation, instability of crop output, market vagaries, lack of remunerative prices, indebtedness, neglect of agriculture by the state, decline of public investment, break up of joint families, individualization of agricultural operations, have been identified as causes for farmer's suicides in the country.

Vasavi (1999) observes that the spate of farmers' suicides is largely due to ecological, economic and social crisis. In her study conducted in Bidar district of Karnataka observes that agricultural recommendations ignored the ecological specificity of the region and the retention of iniquitous social structure is producing agrarian distress. The subordination of cultivators to market and capital forces without any safety net has been causing the devastation of rural community. After green revolution, agriculture became commercialized, and capital intensive, which is not easily available to a majority of the farmers. She observes that from 1987-1992, credit availability to agriculture sector by nationalized banks stagnated at around 11.7 per cent. As a result, there is an increase in the share of non-institutional sources in agriculture credit disbursement and thereby growing indebtedness of the farmers. Though the inputs are available, farmers do not know how to use them due to lack of extension services.

State and agri-business directed agendas that support market based inputs in agriculture and which seek to alter the very ecological bases of agriculture have promoted the erosion of local practices and knowledge. Local agricultural patterns and practices typically drew from a shared repository of knowledge, much of which were transmitted and reproduced through the social and cultural structures of agricultural regimes, having given way to use of external inputs. Vasavi (2012) contends that this has induced increasing dissonance between knowledge and know-how among farmers.

Deshpande's (2002) study on agrarian crisis and farmers suicides in the state of Karnataka finds that the change in the cropping pattern from food grains to commercial crops, increase in the cost of cultivation and marginal remuneration, and lack of institutional credit mechanism were the root causes of agrarian distress. Most of the farmers who committed suicides were small and marginal farmers belonging to backward class communities. Cost of cultivation increased because of higher usage of fertilizers, pesticides. Also, farmers incurred debts for providing irrigation facilities at the individual farm level. State government has withdrawn the support by declining public investment in agriculture. Farmers' dependency on input dealer for the use of inputs has gone up over a period.

Vyas (2004) reports changes in the Indian agriculture, such as small farm character, spread of modern technology and source of different inputs like fertilizers, insecticides, mechanical power and improved seeds from external sources. Within the high input and low output scenario, the result has been the failure to repay the loan. As most of these loans were procured from non-institutional sources, who resorted to social insistence as much as coercive tactics, many self-respecting farmers have taken the extreme step of suicide to save face.

Revathi (1998) in her study on 50 deceased farmers in Warangal district of Andhra Pradesh, points out that the foremost cause of the problem of agrarian distress was irrigation as wells were the largest source of irrigation for about three fourths of the farmers in the region. Generally, farmers had to bear the expenses for digging of bore wells in the region. Due to the depletion of ground water the cost incurred for deepening on bore wells ranges on an average anywhere between Rs. 50,000 to Rs.1, 00,000. 50 percent of the farmers in her study had obtained loans for improvement of wells and about 20 percent incurred debt for digging wells. In case of crop failure, debt burden forced many farmers to commit suicides.

Jayati Ghosh and Chandrasekhar (2006) in their study on 'the burden of farmers' debts' observes that the public agricultural extension services have disappeared, leaving farmers at the mercy of private input dealers. The input dealers functioning without adequate regulation, often suggest a wrong crop and excessive input usage, and they also sell spurious inputs. Declining returns, increasing cost of cultivation and thereby indebtedness pushed farmers into stress resulting in suicides.

Shifting from traditional food crops to commercial crops, high usage of chemical fertilizers and pesticides, fluctuations in market prices and non-availability of credit facilities are some of the after effects of economic restructuring taken place after 1990's. Moreover, this period also witnessed the entry of private players in the agriculture market, which caused a significant change in the agricultural scenario in the country.

Knowledge

Green revolution heralded the shift in knowledge from traditional to modern cultivation practices. This shift was facilitated by agricultural extension services set up by the state. Knowledge of new cultivation practices and inputs and productivity centred notions of crop production were disseminated by the state agricultural

extension agencies. The extension personnel working with state agricultural extension department disseminated agricultural knowledge and skills to farmers to enhance the agricultural productivity and also to overcome the problems in the cultivation process.

Knowledge is the awareness and understanding of facts, truths, or information gained in the form of experience or learning (a posteriori), or through introspection (a priori). Knowledge is the act or condition of knowing something with a familiarity gained through experience or association. It means 'to perceive directly', 'to have direct cognition', to 'apprehend intellectually', 'to acquire facts'.

Knowledge is defined by the Oxford English Dictionary as (i) expertise, and skills acquired by a person through experience or education; the theoretical or practical understanding of a subject; (ii) what is known in a particular field or in total; facts and information; or (iii) awareness or familiarity gained. Knowledge refers to pure and simple information imparted calling for the exercise of recall, recognition and reproduction. It is an appreciation of the possession of interconnected details which, in isolation, are of lesser value. The term Knowledge is understood in entirety within the gamut of cultural products (ideas, ideologies, juristic and ethical beliefs, philosophy, science, technology). Knowledge is primarily concerned with the relations between knowledge and other existential factors in the society or culture (Merton, 1976: 89).

Karl Mannheim considers the evolution of knowledge as a social aspect of group spirit, and therefore as a kind of social process in itself. More specifically, it is a cooperative process in which the knowledge of everyone is developed inside the fabric of common actions that play a related but slightly different character. It is important to observe that a lot of knowledge arises out of 'the collective unconscious' and grows out of collective activities (Emore, 1976). Aristotle believes

that knowledge started with wonder. This is so because humans are endowed with reason, and it is this all-important feature of humans that arouses inquisitiveness in them. This is the reason the expression 'know' in its epistemic sense is entirely reserved for mankind but not to other living creatures.

Knowledge is the internalization of information, data and experience. Tacit knowledge is the personal knowledge resident within the brain, behaviour and perceptions of individual members of the governing body. Explicit knowledge is the formal, recorded, or systematic knowledge in the form of scientific formulae, processes, regulations, organizational archives, principles, etc., and can easily be accessed, transmitted, or stored in computer files or hard copy. Knowledge is built up from interaction with the world, and is organized and stored in each individual's mind (The Digital Strategy, 2006).

Agricultural knowledge

Definitions of agricultural knowledge have changed over time, with changing ideas about agriculture. There is a history of changing visions of, and policies towards agricultural knowledge system. There are two kinds of knowledge systems in agriculture. Traditional agricultural knowledge and modern or scientific agricultural knowledge. The expression 'indigenous knowledge' is often equated with the expression 'traditional knowledge', and indeed they are often used interchangeably. Certain terms like 'indigenous knowledge' (IK), ethno-ecology, local knowledge, 'indigenous technical knowledge' (ITK), folk knowledge, 'traditional knowledge' (TK), 'indigenous science', 'traditional environmental knowledge' (TEK), or 'people's science' are used interchangeably to refer to knowledge that farmers have acquired over generations. Traditional Knowledge or Indigenous Knowledge system refers to,

'traditional norms and social values, as well as to mental constructs that guide, organize, and regulate the people's way of living and making sense of their world. It is the sum of the experience and knowledge of a given social group, and forms the basis of decision making in the face of challenges both familiar and unfamiliar. For millennia, many indigenous cultures were guided by a world view based on the following: seeing the individual as part of nature; respecting and reviving the wisdom of elders; giving consideration to the living, the dead and future generations; sharing responsibility, wealth, and practices reflecting connections to a higher order, to the culture, and to the earth' (Ellen and Harris, 1996).

The word 'indigenous' means 'belonging to a place, native' (Oxford English Dictionary). Thus Indigenous Knowledge (IK) can be defined as a corpus of knowledge belonging to a particular geographical area. Native knowledge, traditional knowledge, cultural knowledge and civilization knowledge are synonymous terms. It is unique to a given culture, society or a country. Indigenous peoples' knowledge systems vary from locality to locality, region to region reflecting the cultural distinctiveness of people resulting from the dynamic and evolving relationship between the people, the land and the cosmos. There is not just one form of indigenous knowledge but there are many. While the sources, structures and methods for acquiring knowledge differ the themes of change and relationships occur repeatedly (Ryser, 1998).

According to Grenier (1998) IK is 'unique, traditional and local knowledge existing within and developed around specific conditions of women and men indigenous to particular geographical area'. It is stated that 'indigenous knowledge system is a cumulative body of knowledge and belief, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment' (Kumaran et al, 2007).

One of the salient features of IK is that it is the knowledge developed by communities living in a particular region. According to Nakata, M (2002) 'indigenous people's knowledge could be considered a subset of what is more broadly referred to as 'indigenous knowledge'. As any other knowledge system, IK is also not static and limited only to that particular area where it is originated. It is very common that IK produced in one particular area or region or country transmits to other areas or regions or countries through travellers, traders, farmers, etc. Another important characteristic is that IK is passed down from generation to generation mostly by the word of mouth and to a lesser extent through writing. Thus, it may be said that it is basically an oral tradition.

Indigenous knowledge or traditional knowledge generally refers to the long-standing information, wisdom, traditions and practices of certain indigenous people or local communities. In many cases, traditional knowledge has been orally passed on for generations from person to person. Some forms of traditional knowledge are passed through stories, legends, folklore, rituals, songs, art, and even laws. Other forms of traditional knowledge are often expressed through different means (Kumar, 2010).

Communities involved in agriculture played an important role in generating knowledge based on the understanding of their environment, devising mechanisms to conserve and sustain their natural resources and establishing community-based organization that serves as a forum for identifying problems and dealing with them through local-level experimentation, innovation and exchange of information with other societies (Warren, 1992).

Observation of nature and through elementary reasoning based on such observation, communities have accumulated and stored working knowledge concerning the effects of certain natural processes, the apparent movements and

functions of some of the heavenly bodies, the habits and haunts of animals and birds, the properties of plants, fruits, flowers and roots, the nature and qualities of different kinds of soils and variations of weather). Indigenous knowledge is historically constituted knowledge and has been instrumental in the long-term adaptation of human groups to the biophysical environment (Purecell, 1998).

Warren (1987) defines IK as a local knowledge that is unique to a given culture or society. According to Rajasekaran (1993) IK is the systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture.

IK is described as a non-conventional body of knowledge that deals with some aspects of the theory, but more of the beliefs, practices and technologies developed without direct inputs from the modern, formal, scientific establishment (Chambers et al., 1989; Gilbert et al., 1980). To Haverkort and de Zeeuw (1992) IK is the actual knowledge of a given population that reflects the experiences based on traditions and includes more recent experiences with modern technologies. Kloppenburg (1992) remarks that local knowledge is the 'knowledge contained in the heads of farmers and agricultural workers'. Flora (1992) draws the relation of indigenous knowledge to the development of technologies. 'Part of indigenous knowledge consists of technologies developed over decades of adjusting farming systems to local agro-climatic and social conditions. And in some circumstances, local knowledge also consists of knowing how to keep conditions of productivity over the long run, rather than maximizing productivity in years of optimal conditions'.

In Semali and Kincheloe's (1999) words 'IK reflects the dynamic way in which the residents of an area have come to understand themselves in relationship

to their natural environment and how they organize that folk knowledge of flora and fauna, cultural beliefs, and history to enhance their lives'. Interplay between biological variation and selection make crop and natural evolution similar to one another, but the two differ by virtue of the role of conscious selection by humans in crop production. Conscious selection implies knowledge systems about the crop and its environment, which are subsets of the more general traditional knowledge and indigenous knowledge.

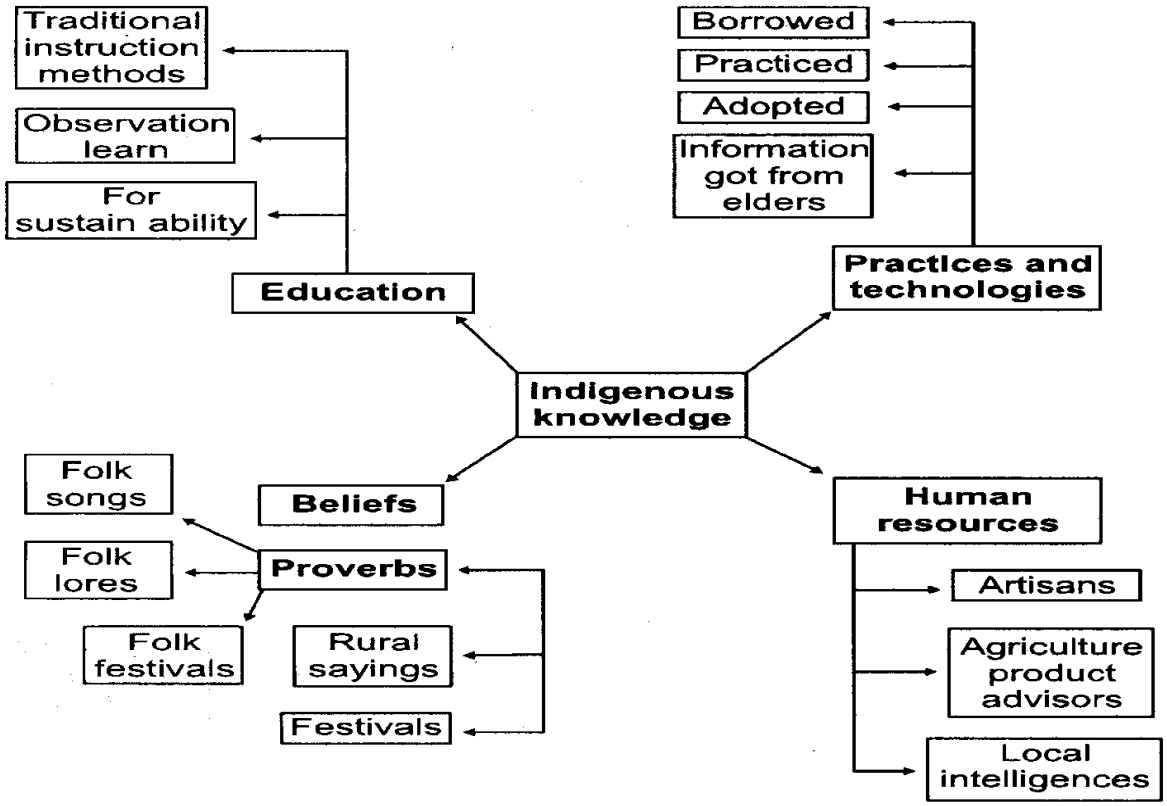
IK is based on, and is deeply embedded in local experience and historic reality, and is therefore unique to that specific culture. It also plays an important role in defining the identity of the community. It has developed over centuries of experimentation on how to adapt to local conditions. It therefore represents all the skills and innovations of people and embodies the collective wisdom and resourcefulness of the community (Warren, 1991). Boef, et.al (1993) observe that traditional knowledge is generally defined as the knowledge of people of a particular area based on their interactions and experiences within that area, their traditions, and their incorporation of knowledge emanating from elsewhere into their production and economic systems. The term traditional knowledge is frequently used to distinguish the knowledge of traditional and indigenous communities from other types of knowledge, such as the knowledge of scientific and industrial communities (Ellen et al. 2000). Traditional knowledge plays a major role even in the modern world. For example, pharmaceutical industry utilizes the knowledge on traditional medicine to develop modern drugs. In areas such as biodiversity and agriculture, there has been a surging interest on the indigenous knowledge.

Traditional agricultural knowledge

Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry. Traditional knowledge is valuable not only to those who depend on it in their daily lives, but to modern industry and agriculture as well. Many widely used products, such as plant-based medicines and cosmetics are derived from traditional knowledge. Other valuable products based on traditional knowledge include agricultural and non-wood forest products as well as handicrafts.

Farmers' traditional knowledge is structured into three basic groups; first set follows certain universal principles and logics, second set is based on the correlation and the third set is based on the local experience without any scientific basis. The knowledge set gives framework to explain relationships between particular events in the climate and farming. Different predictors (environmental, biological and traditional belief) are common among farmers to take critical farm decisions and adaptive measures. This knowledge is evolved by locally defined conditions and needs. It is dynamic and nurtured by observation and experience of the men and women farmers; incorporating their perspectives by slightly modifying and using to meet current needs and situations. Farmers schedule their farming activities well in advance based on almanacs. International organizations such as the World Bank, UNESCO and FAO explicitly acknowledge the contribution that indigenous knowledge can make to sustainable development and poverty alienation. It is believed that IK's potential value for sustainable agricultural development is enormous and it is necessary to preserve it for the benefit of future generations. Perhaps the best way to preserve indigenous knowledge would be the integration of indigenous knowledge into the scientific knowledge paradigm.

Fig.2. 1: Indigenous Knowledge System



Source: Rajasekaran, B. 1993.

Sociology of scientific knowledge

Scientific knowledge does not differ from everyday knowledge by having to do with a different realm of objects. It differs only in the degree of abstraction it involves, the methods and techniques it employs, and the generality of its results. All knowledge is abstract in the sense that all determinateness of character is the result of the specific circumstances and the perspective of the observer (Ramsperger, 1939: 394). Scientific knowledge, according to Marx, is acquired when a social need for that knowledge has been established. However, science is not an initiating force in the dynamics of social change. Developments in this sphere are a response to

forces originating elsewhere. Marx presents a demand determined explanation of the social role of science. Scientific enterprise caters to the demands of the industry and therefore the changing direction of the thrust of science needs to be understood in terms of the changing requirements of the industry.

Today, science is seen as a legitimate social activity. Comparative analysis of science in different societies shows the specific nature of the structure and organization of science, values and norms guiding scientific activities and interaction between science on one hand and economic and political power structure on the other. According to Merton (1976), among the scientific research community there is a well-defined and overriding social objective, that is, the extension of certified knowledge. He observes that science is a social institution which extends verified knowledge.

Scientific knowledge has long held a central role and attained a dominant position in developed societies. The imposition of Western scientific ideas and methods not only cause disruption to existing social and economic relationships, but also might spoil the local knowledge. Allowing science to be the final arbiter of the validity of knowledge, and to establish the threshold beyond which knowledge is not worthy of its name, create the conditions whereby pluralistic cultural heritage is transformed into a monolithic structure.

Knorr-Cetina (1981) in her work ‘Manufacture of Knowledge’ argues that scientific knowledge is an outcome of the constructions based on a series of interconnected selections- theories, methods, experiments and interpretations. She argues that scientists deploy practical reasoning, analogical reasoning and socially situated reasoning in the process of production of scientific knowledge. These selections are influenced by local contingencies and cultural contexts.

It is argued that though in numerical terms the scientific community in India is big, but it is fragile (Shiva and Bandhopadhyay, 1980). Indian civilization has been discovered to be discrepant with the values of modern science (Parthasarathi, 1969). The idiom of 'center' and 'periphery' explains the observed differences between the performance of science among the early and the late starters. According to this view, the scientific establishments in the colonies were set up to meet the ends of the empire. Though independent, the scientists from the former colonies had to look to the centre for ideas and impetus, as scientists' enterprise was not part of the indigenous culture. Kapil Raj (1988) argues that the way a given group views knowledge or its 'image of knowledge' is culturally determined. It forms part of, and plays a crucial part in the practice of a given local scientific community in particular and in the social interaction framework of the club in general. It furnishes the very structure that makes knowledge meaningful. Woolgar (1981) observes that the interests approach is right to show how judgments about knowledge are always socially informed. However, he contends that the judgments of scientists about science are also social constructions. Thus the scientific version of reality cannot be given any special authority. He further observes that scientists' attempts to provide explanations of the way certain ideas are accorded 'scientific' status are just as much socially constructed as any set of knowledge claims.

Technology – Society interface

Traditional accounts by social scientists on the relationship between society and technology have been aimed at understanding the impact of technology on social processes. Social scientists aim to explain social change by centering technology in the discussion. Whether in the case of industrial manufacturing or agriculture the explanations of social change locate the reasons in the new technologies, artifacts, and policies promoting technologies. These kinds of explanations are labeled as technological deterministic perspectives for the reason that they view technology as

an independent factor and social change as a dependent factor. Social research thus tended to focus on the effects, impacts or implications of technology on society.

Technological determinists use linear model of the innovation process and treat technology as 'black-box', and are preoccupied with the social impacts of technology. In contrast to this emerged the perspective called social shaping of technology (SST) which actually calls for opening up of the 'black-box' of technology. It seeks to answer questions about the origin, evolution, interests and meanings of the technology. It tries to analyze the social including economic, cultural, political forces influencing the trajectory of technology development. Scholars like Edge (1988) argue that technological change is not governed by its own internal logic but also by social, cultural, economic and political factors.

Central to the social shaping of technology perspective is the notion that there are choices inherent in both the design of individual artifacts and systems, and in the direction or trajectory of innovation programmes. Analyzing the social influences over the particular technological routes taken social shaping of technology perspective stresses on negotiability of technology. It highlights the social groups and forces which shape the trajectory of technologies to suit their interests. The SST also raises the questions about irreversibility – the extent and the manner in which choices may be foreclosed. Certain choices may be selected and become entrenched.

Actor network theory

Actor network theory recognizes the limitations of both technological determinism and social shaping perspectives. While accepting social categories as one set of factors that determine technology, actor network theory recognizes other factors such as political, economic and non-social and non-technical factors too that affect technology. These factors are described as 'heterogeneous elements' which may be social, natural, technical, non-technical and political in nature. It suggests that the purpose of the sociologist of technology is to study the interaction between these elements and account for the factors that promote or hinder stability among the networks which is called as ‘heterogeneous engineering’ (Law, 1989).

The heterogeneous elements are called by Michel Callon (1989) as ‘actors’ and the relationship among actors is described as an actor-network, which according to him, is not reducible to one single actor or network, but all- encompassing. ‘An actor network is simultaneously an actor whose activity is networking heterogeneous elements and a network that is able to redefine and transform what it is made of’ (Callon, 1989, p: 93). Bijker (1989) introduced an interactionist concept called ‘technological frame’ which is similar to Callon’s ‘network’, because it suggests the interaction among actors. It is a heuristic devise to study all the social groups that are the members of this frame.

> *The inclusion of actors in a technological frame can be specified by describing their goals problem solving strategies, experimental skills of theoretical training and so on; then one should go on to indicate to what extent each of these elements is congruent with the respective elements of the technological frame* (Bijker.1989, p:74).

According to Bijker meanings are attached to artifacts by members of the technological frame. Those social groups which attribute common meanings to the artifacts are grouped together as relevant social groups.

Science and agriculture

The entry of science into agriculture, particularly in crop production, began in Europe in the first half of the nineteenth century. 'The application of science in agriculture began in 1834 when Boussingault laid the foundations of agricultural chemistry' (Howard, 1940, p. 112). Boussingault, a French chemist, was the first researcher in agriculture to devise a theory on plant nutrition which was labelled as humus theory. Humus theory, which explained the role of humus as a source of plant nutrients, was later on demolished by the mineral theory of plant nutrition proposed by Liebig (McCosh, 1984). The mineral theory with its strong foundation in chemistry, in fact carried agriculture science into the fold of chemistry (Howard, 1940). With the scientific establishment of the importance of chemical fertilizers namely, nitrogen, phosphorous and potash, in short NPK, it may be claimed that soil science, with heavy inputs from chemistry, was the first science that evolved in agriculture. Social chemistry was a watershed in the history of agriculture not only for exponential expansion in sciences in agriculture in the years to come but also for heralding industrial incursion into agriculture. When the limitations of chemistry to address the problems of soil deficiencies were realized, other branches of sciences began to emerge. For example, Pasteur's work on soil organisms and Charles Darwin's account of complex life of soil, and Winogradsky's work on nitrification of organic matter, and other advances led to the emergence of sciences like soil bacteriology, pedology (Howard, 1940).

Agricultural practices and technology in India, as in many other Third World countries, had not changed perceptibly for hundreds of years. Agricultural

technology in India at the time of the British invasion in the mid-18th century was comparable or even superior to that in Europe. But while European agriculture changed dramatically during the ensuring two centuries, there was no such change in India. Modern agricultural technology was introduced by the colonial administration mostly to boost the production of exportable cash crops such as cotton, tea, coffee, jute, rubber, and spices.

Modern science was institutionalised in India during later part of the colonial period. In the second half of the 19th century a few pioneering Indian scientists initiated attempts to build a nationalist scientific community against the background of British imperialism. After independence, state policies (for example, the Scientific Policy Resolution of 1958) realized the significance of modern science as an important input in the socio-economic transformation of Indian society, which led to the establishment, and expansion of institutions such as the Council for Scientific and Industrial Research (CSIR), Indian Council of Agricultural Research (ICAR) and Indian Council of Medical Research (ICMR) and Universities (Haribabu, 1991).

Embarking on modernist paradigm India pursued the agenda of scientization of agriculture. The process of introducing science began with state's goal to meet the country's food challenges. Set up over a period with the assistance from the US various agricultural institutions in the country pushed the green revolution technology initially into the pockets of agriculture intensive areas. A reconstruction of the history of the green revolution in India shows that three protagonists played crucial roles in its success. They are the Government of India, multilateral and bilateral donor agencies, and international agricultural research institutions. The institutions under the government of India that planned and coordinated the transfer and diffusion of the new technology were the Ministry of Food and Agriculture and the Indian Council of Agricultural Research (ICAR), along with various agricultural

research institutes and universities spread all over the county. Over time, there has been a substantial quantitative growth in the number of scientific personnel (Haribabu, 1991).

Introduction of green revolution in 1960's and the opening of agricultural sector to private players influenced agricultural knowledge to a great extent. Agri-business determined marketing conditions have been pushing farmers into modern scientific cultivation. This has led to changes in the cultivation practices like high usage of fertilizers and pesticides to get maximum yields. Farmers now cultivate for market. Agricultural labour and other skilled workers whose help is needed in maintaining agricultural machinery are paid in cash. Modern technology began to make a strong impact on agriculture in resource endowed regions where the social, political, economic, and cultural gap between rural and urban areas has shrunk (Parayil, 1992). Dhanagare (1980) suggests that agricultural development through the application of new scientific knowledge was just an euphemism for using the public sector to promote the private seed industry in which the benefit of the new knowledge went invariably to the upper caste rural rich farmers and it seldom reached poor low caste farmers and tenant farmers who needed it most.

According to Ladejinsky (1970) green revolution affected the few rather than many not only because of environmental conditions but because the majority of the farmers lacked resources, or was 'institutionally' precluded from taking advantage of the new agricultural trends. The changes engendered by the new agricultural strategy have brought these and other handicaps into sharp focus at a time when aspirations for betterment are widespread among all classes of farmers, and when most of them need no persuasion that modernization, which stands for bigger crops and higher income, is good for them.

In the later phase farmers from regions which were not covered as part of green revolution switched over to green revolution model through their own efforts. In these regions the local knowledge became irrelevant to a great extent with the adoption of green revolution. Changes in the knowledge form had a bearing on the cultivation practices. Externally sourced high yielding seeds, chemical fertilizers, chemical insecticides, weedicides along with the greater usage of tractors and dependence on bore well irrigation in these regions have become important factors of cultivation. And knowledge about these new inputs became obligatory. Usage of traditional methods of cultivation has declined. For example, application of organic manure, biological control of insect pests, etc. The traditional knowledge that considered all the elements of cultivation– soil, plant, animal, water, etc. for centuries has been replaced by external input intensive agriculture. The new methods of cultivation and the knowledge system have become part of the technological frame of farmers in the regions. All aspects of cultivation are evaluated in terms of yield and productivity. Crop rotation, intercropping, trap crops, use of cattle for agricultural and related operations, have become obsolete as they don't seem to be augmenting productivity directly. Traditionally, Indian farms were small plots of land protected by windbreaks and tree cover. Farmers employed sound methods of organic husbandry that had been used for centuries.

Commercial agriculture promoted by corporate groups can influence market and thus can create conditions wherein farmers are forced to adopt modern cultivation methods. The process which began with the introduction of green revolution, has been marked by the changing knowledge forms about different aspects of cultivation among farmers. It is argued that green revolution resulted in a major shift from traditional to modern practices leading to deskilling of farmers. Due to drastic changes in the cultivation patterns farmers are advised to receive agricultural related information from the agricultural institutions for improvements

in cultivation for maximizing yields. Farmers are increasingly seen as receivers of knowledge and agricultural universities, state and private extension agencies as disseminators of such knowledge. The present study, using the social constructivist account attempts to examine the changing knowledge forms in cultivation.

Social constructivist account of knowledge

The origins of the social constructivist account of knowledge are largely rooted in the social constructivist account of science which falls in the domain of science, technology and society studies. The thesis adopts the view of Restivo and Croissant (2008) that social constructionism is not a philosophy or a philosophical idea but a core concept in sociological theory and reasoning. They argue that

> *Human beings socially construct their lives, their thoughts, their cultures. There is one and only one way that we can come to be, to know things, and to build cultures, and that is through our interactions with others... The key feature of the post-Mertonian sociology of science, associated with social studies of science and technology, or science and technology studies, is that scientific knowledge itself becomes an object of social analysis.*

Social construction theory addresses the inherent social nature of every facet of reality. It outlines the processes of social interactions that give rise to a society's symbols, artifacts, ideas, and behaviors. Social construction focuses on the social group, not the individual. It illustrates that apparently naturalistic or objective phenomena are the outcomes of social processes. It does not deny a 'reality out there', but stresses that we can only 'know' about that reality through descriptions that are socially and culturally created (Wenda K. Bauchspies, Jennifer Croissant, and Sal Restivo, 2006).

Applying these notions to science studies, scholars of science, technology and society studies observe that scientific knowledge is social constructed. The key feature of the post-Mertonian sociology of science is that scientific knowledge itself becomes an object of social analysis. The Mertonians studied the social system of science but not the products of scientific practice. The products of science were considered to be outside of society, culture, and history. However, scholars like Latour and Woolgar (1979) argue that scientific knowledge is socially constructed. Quoting the everyday life of a scientist in laboratory they argue that sense making in science is highly influenced by the social aspects of laboratory.

> *Every ten minutes or so, there is a telephone call for one of the staff from a colleague, an editor, or some official. There are conversations, discussions, and arguments at the benches: "Why don't you try that?" Diagrams are scribbled on blackboards. Large numbers of computers spill out masses of print-out. Lengthy data sheets accumulate on desks next to copies of articles scribbled on by colleagues.* (p. 16)

Thus they extend their arguments beyond the norms as prescribed by Merton. Knorr-cetina (1981) observes that the constructivist interpretation considers the products of science as first and foremost the result of a process of (reflexive) fabrication.

> *the constructive operations with which we have associated scientific work can be defined as the sum total of selections designed to transform the subjective into the objective, the unbelievable into the believed, the fabricated into the finding, and the painstakingly constructed into the objective scientific fact* (p: 122)

Polyvalent to Monovalent knowledge

Referring to the changing forms of knowledge Etzkowitz and Viale (2010) contend that knowledge is increasingly becoming polyvalent in the era of third academic revolution. Transition from univalent to polyvalent knowledge witnesses the collapse of barriers between university and industry.

> *Society is transformed as public private dichotomies in knowledge, institutions, organization and roles evolve from purebred to hybrid, specialization to integration and separation to synthesis. In a 'third academic revolution,' the entrepreneurial university becomes the centre of gravity for economic development, knowledge creation and diffusion in both advanced industrial and developing societies* (p: 2)

Knowledge generation benefits from university, industry, state and markets. Polyvalent knowledge, thus, supersedes the traditional barriers of university and industry, and basic and applied binaries. *In a classic instance of polyvalence, agricultural researchers at land grant universities in the 1930s discovered hybrid corn by extending their government funded research programs, designed to solve* immediate crop problems, to address fundamental questions in genetics (Nevins 1962; Griliches 1957). Monovalent knowledge is considered to be the one that relies upon university research. Universities, in Mode 1 knowledge production, typically conduct research for the sake of knowledge generation. Scientists pursue knowledge production within the Mertonian normative framework. Etzkowitz and Viale (2010) further add that the new scientist in universities may be called as 'Kali Scientist'. They suggest that, similar to that of Goddess Kali who has many arms, the new scientist uses different disciplinary approaches in problem solving.

However, the concepts monovalent and polyvalent knowledge are adopted in the present study in a modified form to understand the transformation in agricultural

knowledge. These concepts are adopted in modification so as to enable explanations about the changing nature of agriculture. Polyvalent knowledge as explained by Etzkowitz and Viale refer to the fact that new scientist synthesizes knowledge from different disciplines in the generation of knowledge for innovation. In the present study the concept of polyvalent knowledge is used to refer to the situation in crop cultivation wherein all possible implications of operations related to cultivation are considered and farmers take appropriate decisions. In other words, traditional cultivation practices consider multiple facets of cultivation like, soil, environment, social, economic conditions of the farmers, suitability in terms of climate and other living organisms while achieving the goal of appropriate yields. Thus it is believed that the decisions made based on polyvalent knowledge tend to maintain balance between man and ecology in agriculture.

Similarly the concept monovalent knowledge refers to the condition which is unidirectional. In agriculture it refers to productivity in terms of yield. The concept monovalent knowledge is used to refer to the tendencies of modern scientific knowledge in agriculture which focuses on productivity alone. Although it talks about sustainability and suitability the scientific knowledge that reaches farmers is only focused on productivity. Thus the transformation in agricultural knowledge is explained in terms of shift from polyvalent knowledge to monovalent knowledge. To put it in other words traditional knowledge that considered all aspects of cultivation is increasingly replaced by modern scientific knowledge that considers productivity alone. The notion of polyvalent knowledge appears close to the notion of sustainable agriculture for the reason that it recognizes multiple dimensions of agriculture, namely, physical, economic, ecological, social, cultural and ethical. It considers the fact that agricultural systems operate at multiple levels: soil-plant system, cropping system or farming system, agro-ecosystem and so on to higher regional, national, and global levels (Lynam, 1994).

The thesis assumes that the transformation from polyvalent is aided by the technological frame that is present in the village. It adopts the SST perspective in explaining the technological frame which opens up or forecloses certain technological options for farmers in cultivation. The technological frame within which farmers make choices is the outcome of several social, technological and political factors. Social factors like family and values associated with cultivation like yield, productivity, efficiency, time, work, etc. influence the technological frame. Political factors like privileging of certain knowledge forms over others, availability of inputs influence the technological frame. Technological factors like access to machinery influence the technological frame. The thesis thus attempts at understanding the technological frame which guides the cultivation practices of farmers from the social shaping perspective. It uses the constructivist framework as its methodological tool in explaining the social processes with relation to agricultural practices in the study village.

Concepts used in the study

Traditional knowledge: Traditional knowledge generally refers to the long-standing information, wisdom, traditions and practices of local people. Here the term traditional knowledge is used to refer to the knowledge farmers acquire through participating in cultivation for a considerable period of time. This consists of knowledge passed on for generation together and the knowledge farmers acquire through experience. This knowledge is shared between the members of the family, community and village.

Scientific knowledge: The term scientific knowledge refers to such knowledge which is passed on to farmers by the agricultural scientists, agricultural extension personnel and by the media- both electronic and print. It refers to the knowledge that is scientifically tested and proved. Generally, agricultural scientists pass on this

knowledge to the agricultural extension personnel who in turn pass it on to farmers. Scientific knowledge in cultivation is privileged over traditional knowledge. Farmers are encouraged to use scientific knowledge instead of relying on traditional knowledge.

Polyvalent knowledge: The term polyvalent knowledge is used to refer to such knowledge which considers multiple factors of cultivation in crop production. It not only considers yield as important goal of cultivation but also considers other factors associated with cultivation like, soil fertility, soil biota, sustainability, suitability to the local soil and climatic conditions, farmers' social and economic status.

Monovalent knowledge: The term monovalent knowledge is used in the study to suggest to the emerging trend in agriculture. It is used to refer to the fact that agricultural knowledge is increasingly oriented towards achieving high productivity and efficiency. Increasing productivity of the crops cultivated and efficiency of the land used for cultivation in terms of yield per acre have been the main guiding force for farmers. Scientific knowledge underscores the point of high productivity by highlighting the yield per acre. Monovalent knowledge, thus, aims at achieving high yields.

Farmer: One who is residing in the study village and engaged in cultivation of crops. By this definition those persons in the village who cultivate on their own either in their own land or leased in land are considered as farmers. All those who don't cultivate, although own land in their name are not considered as farmers.

Technological frame: The concept of technological frame is used in the sense that guides actions, and thinking of farmers vis-a-vis cultivation, and that provides rationality for decisions taken and goals set.

Part- B: Methodology

This part discusses the methodology adopted in the study. The study intending to understand knowledge of cultivation practices among farmers, changes in such knowledge, and co-existence of multiple knowledge systems in agriculture adopted the social constructivist method of research. Constructivist method emphasises intensive understanding of the field situation, actors, processes, and actions.

The study was conducted in Warangal District of Telangana region in the state of Andhra Pradesh (by the time the thesis was submitted Andhra Pradesh has been bifurcated into Andhra Pradesh and Telangana. Warangal district is located in Telangana state). Warangal district was selected for study as the agriculture in the district has seen some bad times with drought, crop failures resulting from pests and disease attack and the non-availability of appropriate and timely agricultural information. Vasavi (2009) observes that from 1995 onwards district agricultural condition/scenario has undergone drastic changes. It includes the reports of farmers' suicides and changing agricultural practices due to the introduction of Bt cotton. Despite the upheavals, agricultural sector has been the major source of livelihood for a large majority of the population in the district.

Field work was conducted in Nainala village of Nelikudur mandal of the district. Nainala village was selected based on the information provided by the agriculture scientists located in Warangal district. A pilot study was conducted in Nainala, Thanduru, Lakshimipuram and Vadepally, villages. These villages shared common features like, distribution of dry, semi-dry, wet lands with multiple crops like paddy, cotton, chili and other crops are being cultivated. After the pilot study Nainala was selected considering the features of agriculture like, wide variety of

crops, cultivation in two seasons, wide spectrum of castes involved in agriculture, etc.

As the study deals with knowledge systems in agriculture, co-existence, interplay and co-evolution of multiple knowledge systems and changing patterns of cultivation, qualitative sociological methods and techniques were used in the study. Techniques like observation (both participative and non-participative), key informant interviews, focus group discussions, formal, informal and in-depth-interviews were used in data collection. Both primary and secondary data were collected. Data on the socio-economic profile of the farmers in the village were collected using an interview schedule. Basic information was collected through a schedule followed by informal in depth interviews, and focused group discussions during a period of six months in the year 2012.

The researcher stayed in the village during July to December 2012 by hiring a small room in one of the farmers' house. Staying in the village helped researcher to gain farmers' confidence and access to insights into cultivation practices. Farmers were approached during day time either at their home or in the farm. Interaction with farmers assembled at the village centre helped researcher to get in-depth understanding of the cultivation practices in the village. Participation in their discussions on farm decisions, accompanying farmers to the nearby town for the purpose of sourcing inputs for cultivation enabled researcher to understand the dynamics of cultivation.

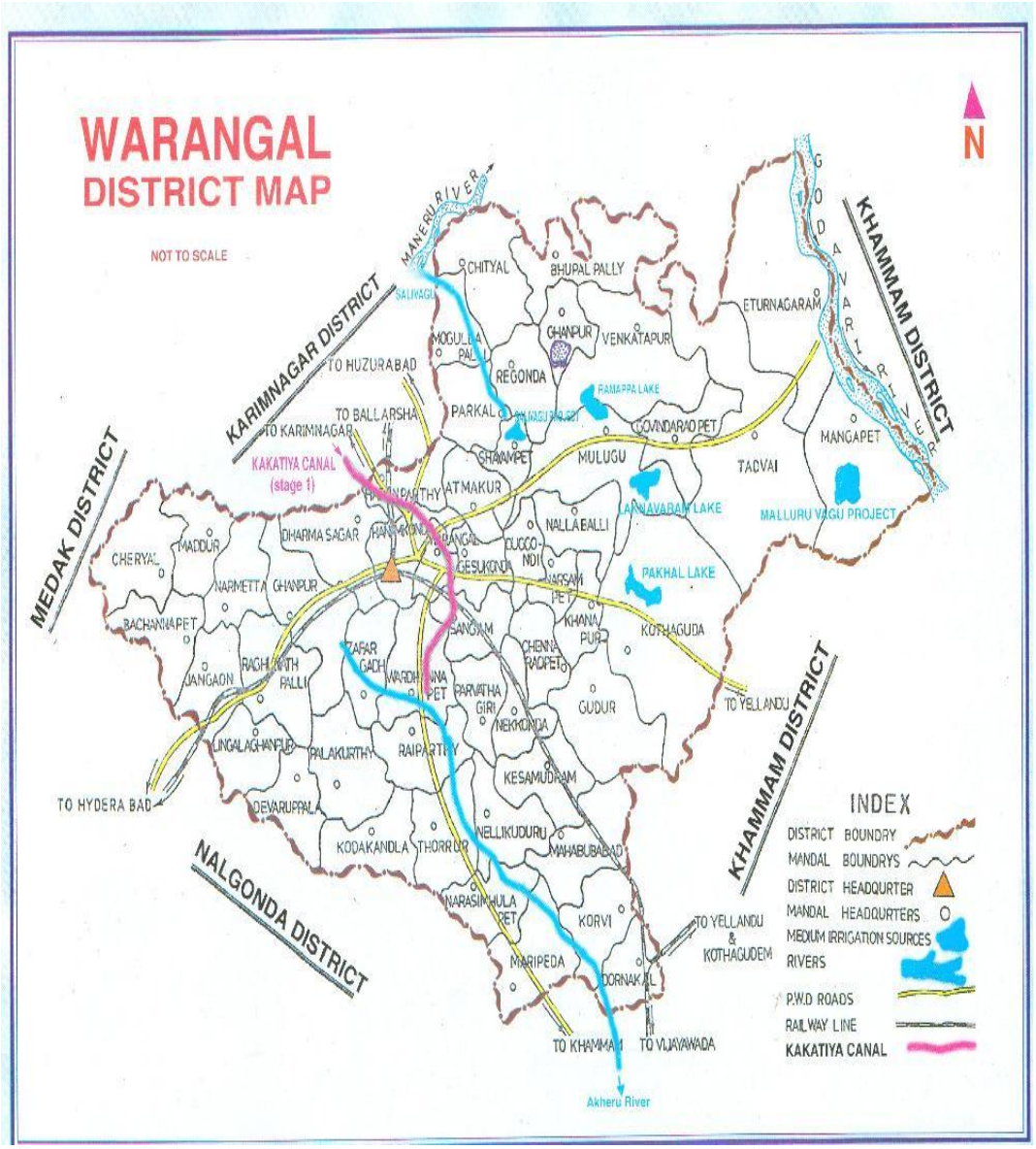
Initially data were collected from village official records about the acerage, cropping pattern, irrigation facilities, caste wise distribution of land holding. From the available of data, using proportionate representative sampling strategy hundred farmers were selected for socio-economic survey. Landholding pattern, crops cultivated, years of farming experience, members of the household, education, income and other aspects were collected using an interview schedule. Data

pertaining to family size and their participation in field operations, marital status, sources of agricultural information, credit, sourcing of inputs for cultivation like seeds, chemical fertilizers and pesticides, cultivation practices, yield details, and marketing conditions were also collected. On the basis of data collected from hundred farmers thirty farmers were selected for intensive study. The sample was arrived at based on proportionate representative sampling technique. From these thirty farmers data were collected on the changing agricultural practices, knowledge systems available in the village, and disposition to farming, etc. During his stay in the village researcher interacted very closely with these thirty farmers. Observation notes were prepared on every setting researcher encountered. Interviews were recorded using a voice recorder. Apart from this researcher collected data from other farmers in the village who have rich experience in cultivation. Key informants include elder farmers, agricultural officials, etc.

Figure 2. 2: Andhra Pradesh State Map

Source:https://www.google.co.in/search?q=ANDHRA+PRADESH+STATE+MAP&biw=1093&bih=534&source=lnms&tbm=isch&sa=X&ved=0CAcQ_AUoAmoVChMIjdztor7yAIVxxWUCh0tWgwR&dpr=1.25#tbm=isch&q=warangal+district+of+andhra+pradesh+state+map&imgrc=lJSgOeyoMVPoVM%3A

Figure 2. 3: Warangal district Map



Source: Water Resources Information System, I & CAD Department 2004.
http://irrigation.cgg.gov.in/dp/WarangalDistrictProfile.jsp

Chapter-III

Profile of the Study Village

Transformation of agriculture has been occurring at a greater speed since last two decades. The semi-arid and arid regions in India, which missed the green revolution, however, over a period of time have got into the whirlwind of changes induced by new agricultural technologies. The extent and the manner in which trickle-down of agricultural technologies across and within the regions is debatable, but it may be said that new regions and new sections of farmers came into the fold of green revolution based agriculture sooner or later. It may not be prudent to suggest that the new agricultural technologies alone caused change, but several factors located in economic, social and political sphere of rural society can definitely be said to have led transformation of agriculture. The important point to be noted in this agricultural transformation is the fact that vulnerable, and often said to be unfeasible sections of farmers and regions came into the fold of new technology based agriculture.

One such region within Andhra Pradesh, which witnessed a tremendous transformation is Warangal district. A village located in the district representing typical agro-climatic and socio-economic conditions of the region was selected for the study. The present chapter describes the profile of the study village based on the empirical data collected by the researcher.

Historical background of Warangal district

Warangal district is one of the districts which has a rich historical background in Telangana state. Warangal's historical links are traced to the dynasties of Great 'Vishnukundins' and even prior to it to the Buddhist period of Indian History. In the beginning, the Rajahs of Warangal were vassals of the Chalukya Kings of 'Vatapi'

in the 8th century. After the downfall of Chalukyan kings, the Rajahs of Warangal assumed independence and gradually rose to power. From the middle of the 12th century to 14th century, this area was ruled by the Kakatiya dynasty. Warangal was the capital city of Kakatiya dynasty.

The name Warangal came from the old name of 'Orugallu', which means one stone ('Oru' means one and 'Kallu' means stone). The entire Orugallu city was engraved on a single rock; hence the name Orugallu was given. This city was also called as 'Ekasila Nagaram'. Marco Polo (famous traveller in medieval period) mentioned in his book about the cultural and administrative distinction of the Kakatiya rulers like Ganapathi Deva, Prathapa Rudra, and Rani Rudramma Devi. They occupied prominent position in the history. The dynasty of Kakatiyas left many monuments, including an impressive fortress, four massive stone gateways, and the Ramappa temple situated near Ramappa Lake. Thousand Pillars Temple, Bhadrakali Temple, and Warangal Fort are the master pieces of Kakatiya sculpture and architecture. (Warangal district Hand Book, 2010).

Musunri Nayaks, after defecting Prathapa Rudra united seventy two Nayak chieftains and captured the kingdom of Warangal. Jealousy and mutual rivalry between Nayaks ultimately led to the downfall of Warangal in 1370 A.D and the success of Bahmanis. Bahmani Sultanate later broke up into several smaller Sultanates, of which the Golconda sultanate ruled Warangal. The Mughal emperor Aurangzeb conquered Golconda in 1687, and it remained part of the Mughal Empire until the southern provinces of the empire split away to become the state of Hyderabad in 1724, which included the Telangana region and some parts of Maharashtra and Karnataka. Hyderabad became an Indian state after 1948 Police action. In 1956, Hyderabad state was partitioned as part of the States Reorganization Act, and Telangana, the Telugu-speaking region of Hyderabad state which includes Warangal, and Andhra Pradesh were clubbed together. Later, in 2014 Warangal

became part of Telangana State when Andhra Pradesh was bifurcated into Telangana and Andhra Pradesh (Warangal district Hand Book, 2010).

Features of Warangal District

The total geographical area of Warangal district is 12,846 sq. kilometres. The soils of the district are comprised of sandy loams with patches of shallow black cotton soils, and places that are composed of even medium and deep black cotton soil.

Topography

The district lies between latitude 17-19" and 18-36" North and longitudes of 78-49" and 80-43" East, and is above sea level by 870 ft. It is bounded on the North by Karimnagar District, on the West by Medak District on the South by Nalgonda District and by Khammam District on East and South-East. The isolated hills, hill streams, rain fed tank and large lakes were segregated into administrative units by the district administration.

Demographic profile of Warangal district

According to 2011 census, Warangal district has a population of 35.12 lakhs. The density of population is 273 persons per sq.km and 9.92 lakhs (28.25%) of people reside in urban areas and 25.20 lakhs (71.75%) people reside in rural areas. The sex ratio and literacy rate in the district are 997 and 65.11 percent respectively. Warangal district has 1098 revenue villages, out of which 1003 villages are inhabited and the rest are uninhabited. The working class population in the district is 15.66 lakhs, which is 55.53 percent of the total population. The workers in the agricultural sector are 9.14 lakhs, forming 28.12 percent of the total district population. The remaining 4.34 lakhs are engaged in non-agricultural sectors comprising 27.7

percent of the total population of the district. The non-working class population is 25.52 lakhs, constituting 78.62 percent of the total district population.

Climate

The climate of the district is generally dry. District annual rainfall is about 1048 mm with 83 percent of rain occurring in four months, from June to September. Rainfall drops from East to West in the district. The rainfall is about 1200 mm and 750 mm in the North-Eastern and Western areas of the district respectively. The normal maximum temperature is about 40^0c occurring in April and May and minimum temperature is about 13.5^0c in December (Warangal district Hand Book, 2010).

Irrigation

The district lies between two major river basins of Godavari and Krishna. The river Godavari, the largest river in the Indian peninsular, flows along the Eastern border of the district in South Easterly direction. Pedavagu and Lakhnavaram are the two main tributaries of the Godavari. In the Southern and South Western part of district, these streams flow towards South and South Easterly direction respectively and empty into the Krishna River. The district is divided into 58 minor basins. Surface water irrigation in the district is mainly from five medium irrigation projects serving an ayacut of 44,887 hectares and to a small extent of 6,170 hectares under Sri Ram Sagar Major Irrigation project. Out of the total cropping area of 5, 33,604 hectares, an area of 3, 56,418 have irrigation facilities. 25.17 percent of the irrigated area is covered by canal water sources, 64.75 percent of the area is irrigated through ground water sources and the remaining by other sources like village ponds.

Rainfall

Warangal district falls under the North Telangana Agro Climatic Zone, which covers all the 50 mandals, based on the temperature that ranges from 28 to 37^0 C. The normal annual rainfall of the district is 1048 mm. The rainfall increases from South West to North East part varying from 924 to 1048 mm. The South West monsoon contributes about 80 percent of the annual rainfall. The annual variation of rainfall is conspicuous. Analysis of the rainfall for the last five years shows that the district received deficit rainfall during four years and excess rainfall in one year. The cumulative departure for the last five years from the normal rainfall is 70 percent indicating that the district is facing continuous drought situation. During the normal rainfall years district received rainfall, which was very erratic and not uniformly spread. Many of the mandals have received deficit rainfall during this period also.

Soil

The soils of the district comprise of sandy loams with patches of shallow black cotton soils, and at places even medium and deep black cotton soils. Warangal district consists of five different types of soils. Shallow red soils constitute 50 percent of the total area, second major soil type is black which covers 25 percent of the total land. Deep red chalka soil is the third type covering 20 percent of the total land in the district, and fourth soil type is problematic soils which cover 5 percent of the total land in the district (Warangal district Hand Book, 2010).

Agriculture

Agriculture in Warangal district includes cultivation of food and non-food crops, animal husbandry, fisheries, horticulture, sericulture and other allied activities. 72 percent of the district population depends on agriculture (Warangal district Hand Book, 2010). From 1995 onwards agriculture in the district

experienced drastic changes due to the entry of private seed companies, new agricultural technologies, and commercialization of agriculture. In the recent decade, the agricultural sector has been worst affected by droughts and untimely rains.

Landholding pattern

According to the 2010 District statistics report, there is an 11.11 decennial growth among the number of farmers in the district. In 1991 census there were 4.14 lakhs of farmers in the district, which increased to 4.60 lakhs by the 2001 census. As per 2010 data there are 5.61 lakhs of farmers in the district (Directorate of Economic and statistics, 2010).

Table No. 3. 1: Land holding pattern in the district

Category of Farmers	No. of. Farmers (%)	Land owned in acres (%)
Marginal Farmers (less than 2.5 acres)	3,54,139 (63.09)	3,81,026.85 (22.10)
Small Farmers (2-5 to 5 acres)	1,17,566 (20.95)	4,07,955.32 (23.66)
Semi-Medium Farmers (5 to 10 acres)	60,020 (10.69)	40,1422.79 (23.28)
Medium Farmers (10 acres to 25 acres)	25,385 (4.52)	3,57,505.43 (20.73)
Large Farmers (more than 25 acres)	4,157 (0.74)	1,75,967.19 (10.20)
Total	56,1267 (100)	17,23,877.60 (100)

Source: *Hand book of Statistics Warangal District-2010*

Table No 3. 1 presents the land holding pattern in the district. 5, 61,267 farmers cultivate 17, 23,877 acres of land. Among them 3, 54,139 are marginal farmers (who have less than 2.5 acres of land) cultivating 3, 81,026.85 acres of land (63 percent of total farmers and 22 percent of total land owned). The number of small farmers is 1, 17,566 contributing 20.95 percent to the total number of farmers,

cultivating 23.66 percent of the total land. However, a mere 16 percent of farmers (belonging to the other three categories) own about 54 percent of the total land in the district.

General features of Nellikudur Mandal

Nellikudur Mandal is one of the 51 mandals of Warangal district, where the study village is located. There are 18 revenue villages, including 22 village panchayats in this mandal. Nainala, the study village is located at about 3 kilometres distance from Nellikudur mandal headquarters and is 68 kilometres away from the district headquarters, Warangal. Agriculture is the primary occupation in this mandal. Paddy, Cotton and Chilly are the major crops grown in the mandal. Nellikudur village is situated between Thorrur (16 km. away) and Mahbubabad (34 Km away) towns. Nellikudur Mandal comes under Mahbubabad revenue division.

Table No. 3.2: Land holding pattern

Category of Farmers	No. of. Farmers (%)	Land owned in acres (%)
Marginal Farmers (less than 2.5 acres)	7,373 (59.92)	8,424.63 (21.95)
Small Farmers (2.5 to 5 acres)	2,905 (23.61)	10,021.74(26.11)
Semi-Medium Farmers (5 to 10 acres)	1,420 (11.54)	9,361.41 (24.41)
Medium Farmers (10 acres to 25 acres)	528 (2.09)	7,638.27 (19.91)
Large Farmers (more than 25 acres)	78 (0.63)	2,733.39 (7.12)
Total	12,304 (100)	38,379.44 (100)

Source: *Hand book of Statistics Warangal District-2010*

Table 3.2. Hand book of statistics of Warangal district 2010 suggests that there are 12,304 farmers cultivating 38,379.44 acres of land in Nellikudur mandal (18 revenue villages, including 22 gram panchayats). Among 12,304 farmers 7,373 farmers belong to marginal farmers category constituting to about 60 percent of total farmers in the mandal owning 8,424.63of cultivable land with a share of about 22 percent of the total cultivable land. Small farmers constitute to about 24 percent of the total number of farmers and own 10,021.74 acres contributing about 27 percent of the total cultivable land. About 14 percent of farmers belonging to the other three categories own 41 percent of the total land in the mandal.

Settlement pattern in the study village - Nainala

Settlement pattern refers to the location of dwellings in the village. Settlement pattern is influenced by many factors like geography, availability of land and water, caste, religion and wealth. Village habitations are generally demarcated along caste lines, thus settlement patterns reflects caste hierarchy also. Generally, center of the village is occupied by the upper castes where important activities of the village take place and where important institutions are situated. Each angle of the center is stretched by the subordinate groups leading to the fag ends left for the marginalized groups.

Major shift in the settlement pattern in the village occurred due to the state initiatives like construction of panchayat office, health centre etc., availability of water, location of religious institutions, and availability of transport facilities. Describing the elementary aspects of village settlements in Sripuram village, Beteille (1969) observes that, ‘Sripuram village is an agrarian village. On the basis of caste hierarchy the people of Sripuram are divided into three subdivisions Brahmins, non-Brahmins and the Adi-Dravidas who are clearly segregated from one

another in the village. The settlement pattern of the village continues to reflect the basic division of the traditional caste structure'.

Generally, the dwellings in the study village are spread across a modest region, granting the village a fairly distinct settlement pattern. Though it seems like a single compact physical unit, when examined from within it reveals that it has important territorial divisions. These territorial divisions are of importance because social norms and values are attached to them. The internal divisions among different castes in the village to a great extent get reflected in these territorial divisions. 'The people who are close to each other in the caste positions tend to live together and where the caste positions differ, they live apart' (Bettelie, 1969). In the original plan each caste had clearly a separate place of settlement. The streets are known after the caste names i.e. The *Reddy* street, *Kapu* Street, *Chakali* Street and *Madiga* street etc.

Settlement pattern in the study village has changed twice in the past ten decades. Previously, large number of dwellings were located in the middle of the village where even now there are a good number of houses. But, eighty years back there was a geographical shift in the settlement pattern. Because of the tragedies which led to certain unfortunate deaths in the village during that time, villagers started constructing houses away from the center of the village under the influence of black-magic and witchcraft. They shifted their houses close to the *Sri Venkatadri* temple hill area, which is located at the North end of the village. Gradually, villagers started constructing houses in the area based on their caste. However, over the last thirty years, village began to shift to its earlier location when the villagers started constructing houses at the earlier place. By the end of 1970's Dalits of the village were given land by the government to construct houses. The new houses sanctioned by the government were built in the place where, at earlier point, majority of the houses were located. In the course of time, other castes like *gowda, mudhiraj, kamsali, vaddera, vadrangi*, etc. started relocating their houses at the center of the

village, along or near to the Dalit's houses. Reasons for the second relocation were availability of drinking water and access to the main road. The other castes like *reddy, munnuru kapu and mala*, still live near *Sri Venkatadri* hill. Presently, village settlement pattern is moving from East to Western parts of the village, closer to the main road.

Figure 3.1: Nainala Village map

Profile of the study village

Nainala is a revenue village which includes two hamlets namely Parvathamma Gudem and Jama Thanda. It is a multi-caste village, where 18 castes live together. Caste plays a very significant role in the day-to-day lives of people and also on the occasions of religious festivals, ceremonies like marriages, death and other caste-related rituals in the village. According to Dumont (1962), 'structure of caste arises from certain ideological predilections that are religious in nature. Caste is based on the principle of opposition between the pure and impure as a single, true and impure that determines hierarchy among the villagers.'

It was found in the study village that, at a broader level, villagers maintain cordial relations among themselves. But a closer observation reveals inherent prejudices and discriminative attitudes based on caste. For instance, an upper caste person in the village makes friendship with other caste member and has normal cordial relations in day-to-day life. Such a cordial friendship takes the form of differentiation and exclusion during the times of important social rituals like marriage or death, participation into which is caste based.

Every caste in the village has its own traditional practices. The households of artisan castes like *Mangali*, *Madiga*, *Chakali*, *Kamsali*, *Kummari*, etc. have been practicing their traditional occupations. In matters of religious importance concerning the village as a whole, different castes play their due customary role. For instance, during the time of *Sri Rama Navami,* the village festival organizing committee arranges for a venue to celebrate and organizers invite all caste groups to take part and perform their caste rituals. Typically, the *Madiga* plays *Dappu (Madiga* caste art and profession*)*, the *Kummari* caste members offer pots to be used during the Pooja, *Chakali* caste members carry the idol during the procession around the village, etc. But this traditional organization of religious festivals is changing over

the past few years. Especially, over the last five years, households of certain castes like *madiga*, *mala*, got converted to Christianity resulting in changes in their participation.

The economic system of the village depends on agriculture. Nearly 60 percent of the houses in the village are semi *pakka* houses. In the case of lower castes like *madiga* and *mala*, they still live in *katcha* and semi- *pakka* houses. Economic disparity among the villagers is clearly visible along caste lines as the upper castes are better off when compared to their lower caste counterparts. This disparity is reflected in the land holding patterns between these two categories as well.

While rice is the staple food, jowar (sorghum) is the alternative food, and curry made with pulses and vegetables is part of the daily menu. Also pickles, rasam form part of the meal. Use of tomato in preparation of curries is predominant. However, it was observed that majority of the villagers consume nutrient poor diet. Meat consumption is occasional. On certain festivals like Dasara, Sankranti and other festivals associated with agriculture villagers consume meat.

Religious beliefs and practices

Nainala is a traditional Hindu village, where Hindu religious customs and beliefs are practiced by the villagers in their day-to-day life. Total population of the village is 2012, out of which 1850 (92.22 percent) are Hindus. Religious practices are dominated by the Hindu traditional caste system. It was observed in the study that religion takes a significant place in the lifestyle of the villagers and therefore influences their outlook and activities.

Some deities are installed under trees, in the open fields or by the side of the road without a structure (building providing shelter). Villagers worship Gods as Gods of this sort by applying vegetable oil, vermilion, turmeric powder etc. Such

sacred stones are worshipped regularly. *Uppalamma, Thalupulamma, Ellammma, Katta Maisamma, Bangaru Maisamma* and *Yakhasaiyulu* are the deities without roof that emerged in the village. Hindu mythological deities like Vishnu and Shiva are the important deities. Apart from these, allied deities like '*Hanumanthudu'* '*Vinayakudu'* are installed in a temple in the village. It is known as *Sri Venkatadri* Temple, which is the oldest temple in the surrounding villages as well. It is located on a hillock in the village.

Every caste in the village has its own deity and members of the caste regularly worship the deity on particular occasions. Goddesses *Uppalamma, Thalupulamma* are worshiped by the *Madiga* and *Mala* castes respectively in the village. *Ellammma, Katta Maisamma* and *Bangaru Maisamma* are the Goddesses of the backward castes like *Gowda*, *Yadava,* and *Vaddera* respectively. Every year, each caste performs rituals and animal sacrifices before the deities. Along with their family members and relatives, either in their houses or in their fields, they indulge in community feast after the rituals and sacrifices. Recently, a year ago 'Boddurai' (laying of the sacrificial stone at the temple site) festival was celebrated by the villagers by raising contributions among themselves and performed their respective caste arts.

47 (2.98 percent) individuals belong to *Christianity* out of which 32 are from *madiga* and rest from *mala* caste. Christianity was embraced by few *Dalit* households in the village about five years back. A son-in-law of a *Madiga* family was the first person who got converted into Christianity, which has resulted in subsequent conversions of 8 *Madiga* and 4 *Mala* households in the village. 43 (2.72 percent) individuals follow *Islam* and they hail from the *dudekula* community, and one person from *madiga* caste converted to *Islam*. There are 11 *Dudekula* caste households in the village. During the Nizam's rule, two *dudekula* families settled in the village. One Scheduled Caste person by name *Mohammed Yousef* (Ramaswamy was his birth name) from *Madiga* community got converted into Islam eight years

ago, because of his faith in '*Annaram Yakhasaiyulu*' (a famous Muslim healer in the area). About his conversion to Islam, Yousef says,

> *"for many years I suffered a lot due to ill-health, and consulted many doctors and went for medical check-up without any cure. At last with a suggestion from fellow villagers, I visited Annaram Yakhasaiyulu 'Dharga', which is almost 40 kilometers away from my village. After visiting Annaram Yakhasaiyulu 'Dharga' I got cured from my illness. From then on, I gladly accepted Islam as my religion. There were differences within the family and in the caste due to my conversion to Islam. So, I am staying away from my house and residing with Muslim families, and even married a Muslim woman in the village itself".*

Every year a *Jatara* (annual religious festival) is organised in the village. Outsiders also come and place their offerings at the *Sri Venkatadri* temple and participate in the *Jatara*. The *Jatara* is held on the last day of the three day festival of Sankranthi. The *Jatara* is celebrated in a grand manner by the village farmers. By the time of *Jatara,* farmers would have completed harvesting of crops of Kharif season. Harvest benefits reach home, and with sheer happiness farmers celebrate this festival grandly by offering first food grains to the God in the temple. During the three-day festival, there is a procession by the village youth and a dance is performed according to the beat of folk songs throughout the village. In the *Jatara,* farmers decorate their bullock carts and ride them around the temple three times as part of the customary practice seeking blessings from God.

Social composition of the village

Caste plays a crucial role in the socio-economic, cultural and political aspects. Every caste has its own culture, tradition and some of the castes have their own profession which they practice and perform in their daily life. Nainala revenue

village includes three hamlets and one village panchayat. Total number of households in Nainala revenue village is 1,181, out of which 546 households are located in Nainala village, 194 households in Parvathamma Gudem, 157 in Rathiram Thanda and Jama Thanda 284. Table 3.3 presents the caste wise distribution of households and population of the village.

Table No. 3.3: Caste wise distribution of the households and population

Sl. No	Caste	No. of households (%)	No. of persons (%)
1	Yadava	127 (23.26)	554 (27.62)
2	Madiga	98 (17.95)	440 (20.06)
3	Gowda	82 (15.01)	321 (16.00)
4	Mudhiraj	55 (10.07)	137 (6.83)
5	Vaddera	53 (9.70)	90 (4.49)
6	Chakali	33 (6.04)	134 (6.68)
7	Munnru Kapu	25 (4.78)	62 (3.09)
8	Mala	19 (3.48)	83 (4.06)
9	Reddy	16 (2.93)	53 (2.64)
10	Dudekula	15 (2.75)	53 (2.64)
11	Mangali	10 (1.83)	32 (1.59)
12	Komati	3 (0.55)	8 (0.51)
13	Vadrangi	3 (0.54)	12 (0.59)
14	Kummari	2 (0.36)	9 (0.39)
15	Yanadhi	2 (0.36)	4 (0.19)
16	Brahmins	1 (0.18)	5 (0.25)
17	Kamsali	1 (0.18)	3 (0.15)
18	Mera	1 (0.18)	6 (0.51)
	Total	546	2006

It may be observed from Table 3.3 that Nainala village has 546 households with a population of 2,006. *Yadava* caste is the largest in the village both in terms of households and population. It has 127 households (about 23 percent of the total households) and a population of 554 (about 28 percent of the total population). *Madiga* caste ranks second in terms of number of households and population, with 98 (about 18 percent of the total households) households and a population of 440

(20 percent of the total population) followed by *Gowda* caste with 82 (15 percent of the total households) households and 321 (16 percent of the total population) people. *Vaddera* caste has a population of 90 with 53 households. The peculiarity of the caste is that its members don't reside in the village throughout the year like other castes. It is a semi-nomadic caste, and most of the members work as construction workers in different parts of the district and even in Hyderabad. They come to the village at the time of festivals and go back immediately. *Mudhiraj* caste has 55 households and a population of 137. Members belonging to *Chakali* caste are 85 in number with 25 households. *Mala* is a scheduled caste which has 19 households with 83 persons. *Dudekula,* whose members are identified as Muslims, has 15 households with a population of 53 persons. *Brahmin*, *Kamsali*, *Mera* and *Yanadhi* castes are represented by only one household each. *Reddy,* the traditionally dominant caste in the village whose members own highest landholdings and which used to enjoy economic, social and political recognition in the village is represented by just 16 households with a population of 53.

According to the traditional caste hierarchy, *Brahmins*, *Komati* and *Reddy* belong to the upper strata with 20 households and with a population of 66 constituting just about 3.29 percent of the total population in the village. *Chakali, dudekula, gowda, kummari, kamsali, mangali, mera, mudhiraj, munnuru kapu, vadrangi, vaddera* and *yadava* are the castes considered under OBC have 309 households with 1,413 persons contributing 70.43 percent of the total population in the village. *Madiga* and *mala* are the scheduled castes, with 117 households and a population of 523 contributing to about 26.07 percent of the total village population. *Yanadhi* is the only Scheduled Tribe in the village having two households with just 4 members.

Educational status

Education is an important indicator of development. According to 2011-12 data available with the Mandal Upper Primary (MUP) School, the literacy rate in the village is 66 percent. Out of a total population of 2,006 persons in the village, 1,334 (66 percent) are literate, constituted by 752 (56 percent) men and 582 (44 percent) women. There is a MUP (1st class to 7th class) in the village, which was established in the year 1972. Children from other two hamlets (which come under revenue jurisdiction of the village) also study in the same school.

Table No. 3.4: Enrolment pattern in the school

Sl. No	Year	Boys	Girls	Total
1	1990-01	280	80	360
2	1995-06	210	105	315
3	2000-01	158	148	306
4	2005-06	168	140	308
5	2009-10	143	125	268
6	20011-12	48	075	113

Source: *Records of Mandal Upper Primary School, Nainala: 2012*.

Table 3.4 sugests a significant change in the enrolment pattern in the school in the last one decade. There is a gradual decline of enrolment of boys year by year, while the enrolment of girl students is increasing. It was reported by the parents in the village that they send boys to English medium schools in the nearby towns and enrol girls in the village school. Total number of students in the year 1990-91 were 360 which decreased to 268 by the year 2009-10. But in the year 2011 -12, total strength decreased to just 113. The number of girl students is more than boys reflecting the preference of the villagers for boy's education, who are sent to English medium schools outside the village. Although, the number of girl students is increasing, it only shows that parents prefer girls to study with vernacular medium at no extra cost. The cost of education in the private English medium schools is high

and parents prefer to spend on boys than girls. Very few parents who are able to spend money to send their daughters to the English Medium Schools. After passing out from 7th standard in the Mandal Upper Primary school, children of the village have to go to Nellikudur (Mandal head quarter) which is about 4 km away from the village to pursue high school education. Because of the long travel involved, not many parents prefer to send their daughters for higher studies. It was observed that many girls dropout after 7th class.

Land holding pattern

The village has a history of land reforms. Land reform refers to the redistribution of land to the landless. Land reforms in the village took place because of the agitation of Communists. The village has a historical association with the Communists. At the time of Razakar aggression in 1948, villagers helped and protected Communist leaders. This solidarity has encouraged the Communists to support the cause of land redistribution in the village. In 1960s the *gowda*, *yadava* and *madiga* castes have led the movement of occupying barren land in the village. With the help of politicians they have started cultivating the lands. After several agitations and representations to the district administration, in 1980s the district collector of Warangal, *Kaki Madhava Rao* sanctioned 500 acres of forest land to the 100 landless families in the village and provided land patta (authorisation deed) of the land. In 2005, the government of Andhra Pradesh transferred the legal rights to the villagers.

Land holding pattern in the village reflects the traditional socio-economic and political hierarchy. Based on the land ownership the households in the village may be divided into two types i.e., landholding and landless. According to the Nainala village official records of 2012, the total geographical area under Nainala village is 1,554 acres, out of which the cultivable land is 1,143 acres (80 percent)

The cultivable land comprises of 725 acres of dry land (which depends on rainfall for cultivation) and 418 acres of irrigated land, and the remaining 411 acres (20 percent) of land comprises of houses, tank and barren land. Village tank (covers 50 acres of land) and tube wells (numbering about 350) are the major sources of irrigation.

Table No. 3.5: Caste-wise distribution of land

Sl.No	Caste	No. of households	No. of acres	No. of landless households	% of land
1.	Yadava	127	389	38	34.01
2.	Madiga	98	210	27	18.36
3.	Gowda	82	135	10	11.80
4.	Mudhiraj	55	34	3	2.97
5.	Vaddera	53	25		2.18
6.	Chakali	33	83	2	7.25
7.	Munnru Kapu	25	55	3	4.80
8.	Mala	19	59	10	5.16
9.	Reddy	16	92		8.04
10.	Dudekula	15	39	2	3.41
11.	Mangali	10	10	4	0.87
12.	Komati	3		3	
13.	Vadrangi	3	1	2	0.08
14.	Kummari	2		2	
15.	Yanadhi	2	1	1	0.08
16.	Brahmin	1		1	
17.	Kamsali	1	10		0.87
18.	Mera	1		1	
	Total	546	1143	109	100

Source: *Village Panchayat records. 2012*.

Table 3.5 shows that 437 (80 percent) households own land and 109 are landless. Majority of the land is in the possession of *yadava, gowda, madiga, munnuru kapu* and *reddy* castes. The numerically dominant caste (*yadava* caste with 127 households) holds 389 acres of land constituting about 34 percent of the total land in the village. *Gowda* caste has 82 households who own 135 acres of land (12

percent of the total land). *Madiga* and *mala* are the scheduled castes which hold 269 acres of land out of 1,143 acres of total land constituting to about 24 percent of the total cultivable land. *Reddy* caste households are 16 who hold 92 acres of land with a share of 8 percent of the total cultivable land. *Vaddera* caste holds 25 acres of cultivable land. *Dudekula* caste holds 39 acres (about 3 percent) of land in the village. *Vadrangi*, *Kamsali* and *Yanadhi* castes hold less than one percentage of the total land holdings of the village.

Table No. 3.6: Caste-wise distribution of irrigated and rain fed land (in acres)

Sl.No	Caste	Irrigated	Rain fed	Total
1	Yadava	114	275	389
2	Reddy	78	14	92
3	Gowda	55	80	135
4	Madiga	40	170	210
5	Munnru Kapu	40	15	55
6	Chakali	30	53	83
7	Mala	22	37	59
8	Mudhiraj	16	18	34
9	Vaddera	14	11	25
10	Dudekula	6	33	39
11	Mangali	2	8	10
12	Kamsali	1	9	10
13	Vadrangi		1	1
14	Yanadhi		1	1
	Total	418	725	1143

Source: *Village Panchayat records. 2012*.

It may be ascertained from Table 3.6 that a majority of the irrigated land is held by the members of the dominant castes like *reddy* and other OBC castes like *gowda*, *mala*, *chakali* and *yadava*, *mudhiraj* and *munnuru kapu*. *Reddy* caste households possess the highest number of irrigated lands. *Yadava* caste households own 114 acres of irrigated land out of 389 acres owned by its caste members. Out of 210 acres of total landholding by the *madiga* caste households 170 acres is rainfed.

Credit facilities

The village has wide range of credit coverage. Credit needs of the farmer are met by a cooperative credit society bank, and the State Bank of India branch located in the Mandal headquarter i.e., Nellikudur. State bank of India provides short, medium and long term loans. Banks revise the amount of fresh loan from time to time. It sanctions loan by keeping the copy of '*bhoomi patta*' at the bank. It sanctions loans to the tune of Rs. 5,000/- to Rs.10, 000/- per acre with a maximum amount of Rs.60, 000/- for each farmer. Villagers report that the bank is slow in sanctioning loans and highlight the problems of favouritism. They also report that middlemen play a vital role in obtaining loans.

The informal credit sector also flourishes in the village. Farmers rely on money lenders, fellow farmers, relatives, progressive farmers and traders for loan. The interest rate is 24 percent per annum. In fact, about five years ago the interest rate was 48 to 60 percent, but was reduced as no one was paying the principle back. The informal credit flourishes mainly to meet the cultivation needs as banks delay in sanctioning loans.

Agricultural situation in the village

Cultivation is taken up in two seasons in the village. Wherever the irrigation facilities are available two crops, one in Kharif and the other in Rabi are raised. To a great extent farmers rely on tube wells for irrigation. Major crops grown in the village are Paddy (*Oryza sativa*), Cotton (*Gossypiumsp*), Turmeric (*Curcuma longa*) and Mirchi or Chilly (*Adsicucm anmum*), Groundnut (*Arachis hypogoca*), and Maize (*Zea mays*). Paddy, Groundnut and Turmeric are the crops cultivated in the irrigated land. Cotton, Mirchi, and Maize are cultivated as rainfed crops.

Landholding pattern in the village

Table No. 3.7: Landholding pattern

Category of Farmers	No. of. Farmers (%)	Land owning (%)
Marginal Farmers (less than 2.5 acres)	133 (47.84)	273 (23.89)
Small Farmers (2.5 to 5 acres)	87 (31.29)	358 (31.32)
Semi-Medium Farmers (5 to 10 acres)	47 (16.91)	345 (30.18)
Medium Farmers (10 to 25 acres)	11 (3.96)	167 (14.61)
Total	278	1143 (100)

Table 3.7 shows that there are 278 farmers cultivating 1,143 acres of land. Out of this 133 (about 48 percent of the total number of farmers) farmers own less than 2.5 acres of land. The area under their cultivation is 273 acres (about 24 percent of the total cultivable land). 87 farmers are in the small farmer's category, who own land between 2.5 to 5 acres, constituting about 31 percent of the total number of farmers in the village. They own 358 acres of land with a share of about 31 percent of total cultivable land. In the semi-medium (who own land between five and ten acres) category 47 (about 17 percent of the total farmers) farmers own 345 acres of land constituting about 30 percent of the total land in the village. 11 medium farmers who own land between 10 and 25 acres, constituting of just about 4 percent of the total number of farmers, hold 167 acres of land (about 15 percent of the total land). There are no large farmers (who own more than 25 acres). Asides there are 34 tenant farmers in the village. Among 34 tenant farmers, 16 belong to *yadava*, 8 to *madiga*, 4 to *dudekula*, and 2 each to *mala, mudhiraj, munnuru kapu* castes. *Vaddera* and *reddy* farmers lease out land.

Years of experience in cultivation

Apart from categorizing farmers on the basis of land holding, the study also considered years of experience in cultivation as an important indicator to understand the shifting nature and pattern of cultivation. The study assumes that years of experience in cultivation have a direct bearing on the farmers' disposition towards various aspects of cultivation. The technological frame which guide the actions, thinking and outlook of farmers is dependent upon the experience in cultivation. Those farmers who have been in cultivation for more than three decades have witnessed the cultivation practices before the introduction of green revolution. And they also have witnessed the onset of green revolution in the form of scientific practices. These groups of farmers are now witnessing the externally sourced and market dependent cultivation. Thus the study collected data on the years of experience in cultivation from farmers in the study village. Farmers are categorized as young, middle-aged and senior based on the years of experience. Those who have less than ten of experience in cultivation are categorized as young farmers, those with eleven to thirty years as middle level farmers and those with more than thirty years of experience as senior farmers.

Table 3.8: Years of experience in cultivation

Category of Farmers (years of experience in cultivation)	No. of. Farmers (%)	Land in acres (%)
Young farmers (less than 10 years)	51 (18.34)	186 (16.27)
Middle Level Farmers (11 to 30 years)	143 (51.43)	617 (53.99)
Senior Farmers (more than 31 years)	84 (30.21)	340 (29.74)
Total	278 (100)	1,143 (100)

Table 3.8, presents that there are 51 (18 percent of the total farmers in the village) young farmers who have less than 10 years of experience in cultivation. Young farmers cultivate 186 acres of land (16 percent of the total land). There are

143 middle level farmers who have 11 to 30 years of farming experience. This is the single largest group as it constitutes to about 53 percent of the total number of farmers. They cultivate 617 (about 54 percent) acres of total land. Third category is senior farmers who have more than 30 years of farming experience. There are 84 (30 percent of the total number of farmers) farmers who cultivate 340 acres (29 percent of the total cultivable land) of land.

Nature of agriculture in the study village

An attempt has been to present an overall description of the current agricultural practices in the village, changes taken place over the years. The time period is fifty years as the researcher could speak to only few farmers to know the changes witnessed in agriculture in this period.

The cultivable area in the village has been steadily increasing over the past two decades. Earlier cultivation was taken up only during Kharif which is basically rainfed cultivation. Only few acres of the village were under paddy cultivation. Those farmers who had open wells cultivated paddy in Kharif and sometimes in Rabi also but to a limited extent. Water was drawn using bullock power by means of traditional water lifting methods. Requirement of labour was high and the area under such irrigation was considerably less. Once electrification began in the village, sometime in late 1980s electric pumps were used to draw water from open well. This has made more water available and as a result area under cultivation of paddy has increased.

The flip side of this was that water table had gone down because of large scale use of water for irrigation. Many farmers who had no open wells started digging them as paddy was considered as the most important crop not only for food consumption but also for encashing in the market. Even the government offered subsidies for farmers from lower castes, particularly, SCs of the village, under

different schemes for digging wells. For example, million well scheme is one such scheme which acted as a catalyst for open wells and paddy cultivation.

In the early and middle of 90s witnessed the availability of bore well technology in the village. This actually had led to considerable changes in the cultivation practices in the village. Farmers, irrespective size of holding were attracted to the idea of cultivation of paddy and other crops in the Rabi season also. State promoted the digging of bore wells by providing loans through banks under subsidy and non-subsidy basis. Banks also provided loans under land development scheme for the purchase of electric motor and pump. Over the next decade the reach out of the bore well digging technology was enormous. As a result almost every farmer started digging bore wells. In the study village farmers of all castes and land holding categories have dug bore wells. In fact many of the farmers in the village had dug more than two bore wells. It was found during the study that even a farm of not more than half-an-acre had more than two bore wells.

The urge for assured irrigation spread like wildfire among farmers in the village and in the region. State also played its role by providing subsidized loans through banks, by promoting paddy at the cost of rainfed crops by means of assured market price and mechanism for paddy alone. This had resulted in catastrophic changes in the village. Ground water levels have gone down in the last two decades. As a result farmers were reported to be going for second, third, fourth bore well digging for irrigation water. Every new bore well digging added financial burden to the farmers. In fact some farmers sold their lands to repay the debts incurred towards digging the bore wells. The other catastrophic change include environmental damage witnessed in the form of depletion of ground water. Also, it encouraged monocropping in the village. Many acres under rainfed cultivation got converted to paddy fields.

The total cultivable area of the village is 1143 acres which include 740 acres of dry land and 403 acres of irrigated land. Major crops grown in Kharif are Paddy (*Oryza sativa*), cotton (*Gossypium Sp*), turmeric (*Curcuma Longa*), mirchi (*Cadsicum Anmum*), groundnut (*Arachis Hypogoca*), and maize (*ZeaMays*). Crops grown in Rabi include paddy, maize, and vegetables.

The major crop for the farmers of the village is paddy. Paddy for them serves both purposes. One, as a food crop it provides food security. Second as cash crop it provides them economic security. After apportioning for domestic consumption paddy is sold in the nearby market. Paddy also has the social importance in the village. Earlier, before the onset of commercial agriculture, the artisan castes like washerman, blacksmith, potterer, barber, etc. used to receive payment for their services in kind. The most preferred grain was paddy. It was paid in local standards of measurement at the time of harvest of Kharif crop. Even agricultural labourers used to prefer paddy instead of cash payment. This system has changed after the irrigation intensive agriculture has begun. As the investments on cultivation increased farmers started to prefer to pay in cash and sold paddy in the market. On the other hand the artisan castes and agricultural labourers began demanding cash payment as rice was made available through the public distribution system in the village. Farmers in the village suggest that after the introduction of 'Two Rupees Kilogram Rice' scheme by the then Chief Minister (in the mid-1980s) late N. T. Rama Rao of Telugu Desam party people in the village had greater access to rice. Thus, mode of payment switched from kind to cash. However, interest among famers for paddy cultivation has not decreased. In fact it has doubled as the state started procuring paddy to meet the demands of the public distribution system in the state. This has created assured market for paddy and farmers' interest for paddy has further increased. Farmers suggest that paddy has always had the first place in their cultivation agenda.

Historically speaking, the area under paddy cultivation was not so much in the early 1980s. The importance to paddy grew as farmers in the region have heard of the wealth creation due to irrigation intensive paddy cultivation in the coastal areas of Andhra Pradesh. Also, over the years because of the undue emphasis on paddy by the successive state policies, and by the green revolution paradigm promoted by the agricultural scientists, paddy has emerged as the most reliable crop. Apart from the assured market state also supports it by offering the minimum support price, which doesn't exist for many other crops.

Next to paddy, cotton is the most preferred crop by the farmers of the village. Cotton is grown under rainfed as well as irrigated conditions (semi-dry) in the village. It is the most important crop in the economy of farmers of Nainala village. The next economically important crop in the village is turmeric (*Curcuma longa*). It has been cultivated since generations and the village is known for turmeric cultivation in the mandal. Other crops cultivated in the village are mirchi, maize, groundnut and pulses.

Political structure

Nainala is a revenue village with its own panchayat administration. The Village Administration Officer (VAO), who is a government servant, looks after the revenue administration. The panchayat President or Sarpanch who is the head of 'Gram Panchayat' is directly elected by the voters in the village. Presently, the president of Panchayat is a Dalit who was elected to the post under the rule of reservation. The introduction of adult franchise and direct elections to the village Panchayats has had a significant impact on the socio-economic and political aspects of the village. Although, caste plays a significant role in elections and other political matters of the village, Communist ideology has been dominating the political scenario in the village for a long time. The villagers have installed the statues of

eight Communist leaders at the entrance and in the centre of the village. The older generation still follows the Communist ideology while the young generation is affiliated with different political parties of today.

The politically dominant caste in the village is *gowda*, which is also the numerically dominant caste. Village politics have been dominated by the members of *gowda* caste for the past 29 years. *Perrumalla Narasaiah*, who belongs to the *gowda* caste, has been the village Sarpanch from about 29 years, from 1959 to 1988. He was affiliated to the Communist party. It was reported by the villagers that during his tenure OBCs, SCs and STs had benefited greatly. As a mark of recognition of his contribution to the village the statue of Perrumalla Narasaiah was installed at the centre of the village. After the end of his tenure in 1988, persons from *yadava*, *reddy,* and *madiga* castes served as sarpanches. Telangana Rashtra Samithi (TRS), Communist Party of India (CPI), Indian National Congress (INC), Telugu Desam Party (TDP), are the major political parties the village. Farmers in the village, irrespective of caste, take active part in the political process. Their participation in the rallies is primarily related to agriculture, for example, increasing the minimum support price, the supply of electricity to the farming sector, the availability of inputs, etc. The Communist Party's functioning helped the farmers in organising agitations.

Socio-economic profile of the respondents

Data were collected from 100 respondents who were selected based on the land holding. Proportionate representative sample was drawn to ensure proportionate representation to farmers in the different land holding categories. The respondents were identified based on the list of farmers generated by the researcher using the *pahani* available with the VRO. Based on the extent of land holding farmers were categorised into marginal, small, semi-medium and medium. From each category

the proportionate number of respondents was drawn. However, more number of respondents were drawn under medium farmer's category as it was considered that their inputs for research would be important. Most of the respondents under medium farmers' category have more than fifteen years of experience. Apart from land holding, caste also was considered as the criterion in the selection of the respondents. This was done to ensure representation of respondents from all major castes in the village. Data were collected from the respondents of the sample using the semi-structured interview schedule. The schedule contained questions related to issues concerning social, economic and agriculture. The respondents were met at their respective homes. They were also met in their farms.

Caste and land ownership

Table 3.9: Caste wise land ownership

Sl.No	Caste	Total no. of. respondents	No. of acres (%)
1	Yadava	34	128 (33)
2	Madiga	25	58 (15)
3	Gowda	15	55 (14)
4	Mala	6	21 (5)
5	Chakali	5	30 (8)
6	Munnuru Kapu	5	26 (7)
7	Reddy	3	43 (11)
8	Dudekula	3	8 (2)
9	Mudhiraj	3	6 (2)
10	Mangali	1	8 (2)
Total		100	383 (100)

It may be ascertained from Table 3.9 that a majority of the respondents belongs to *yadava* caste. *Yadava* caste is also the numerically dominant caste in the village. The respondents (34) belonging to *yadava* caste hold 128 acres of land (33 percent) out of 383 acres of land held by 100 respondents. The next biggest number of respondents is from *madiga* caste (25) who own 15 percent of the land, followed by *Gowda* (15). Who owns 14 percent of land. Although, their number in the sample

is less, respondents belonging to *Reddy* caste own 11 percent of the total land held by the respondents.

Table 3.10: Land holding pattern among the respondents

Category of farmers	No of respondents
Marginal	48
Small	30
Semi-medium	15
Medium	7
Total	100

Table 3.10 suggests that among hundred respondents 48 belong to marginal category and 30 belong to small farmers category. There are fifteen semi-medium and seven medium farmers among the respondents.

Table 3.11: Distribution of respondents along caste and farmers' categories

Sl. No	Caste	Marginal	Small	Semi-medium	Medium	Total no. of respondents	No. of acres (%)
1	Yadava	17	12	5		34	128 (33)
2	Madiga	14	10	1		25	58 (15)
3	Gowda	9	3	2	1	15	55 (14)
4	Mala	3	2	1		6	21 (5)
5	Chakali	1	2	1	1	5	30 (8)
6	Munnuru Kapu	1	1	3		5	26 (7)
7	Reddy			1	2	3	43 (11)
8	Dudekula	3				3	8 (2)
9	Mudhiraj				3	3	6 (2)
10	Mangali			1		1	8 (2)
Total		48	30	15	7	100	383 (100)

Table 3.11 indicates that out of the total 48 farmers belonging to the marginal farmers category 17 belong to *yadava* caste, followed by *madiga* (14 in number). Out of 34 respondents from *yadava* caste fifty percent belong to marginal category. Out of 25 respondents from *madiga* caste 14 belong to marginal farmers category.

It may be observed that 53 percent of the respondents are from *yadava* and *madiga* castes who belong to the marginal and small farmer categories. There are only 22 respondents who belong to the semi-medium and medium farmer categories.

Educational profile

Education plays a very important role not just in day-to-day life, but also in cultivation. An educated farmer would be in a better position to make informed decisions. Education enhances the ability to understand and comprehend things related to agriculture.

Table No. 3.12: Educational profile of respondents

Sl. No	Caste	No formal Education	Primary	Secondary	Inter-mediate	Gradu--ation	Above Graduation	Total
1	Chakali		3	2				5
2	Dudekula	1		2				3
3	Gowda	2	3	5	3	2		15
4	Madiga	10	7	6		2		25
5	Mala	1	1	4				6
6	Mangali			1				1
7	Mudhiraj		1	2				3
8	Munnuru Kapu	1	1	1	1	1		5
9	Reddy				2		1	3
10	Yadava	17	6	6	3	2		34
Total		32	22	29	9	7	1	100

Table 3.12 presents the educational status of respondents on the basis of their caste. It suggests that there are thirty two respondents, out of hundred, who have no formal education. Out of 32 respondents a large majority belong to *yadava*, an OBC caste, followed by *madiga*, a scheduled caste. 22 respondents have stopped with primary education (first class to fifth class). There are 29 respondents who have studied up to tenth class. Nine respondents have studied up to the intermediate level. The reasons for poor educational levels are lack of educational facilities in the

village and lack of transportation facilities to pursue higher education in the nearby towns. A majority of the respondents suggested that they discontinued education because of serious economic problems in the family. Only seven out of hundred respondents have completed intermediate and joint degree, but all of them discontinued the course. Only one respondent has completed post-graduation (M.Sc.). Fifty percent of the respondents belonging to *yadava* caste have no formal education. Similarly, a large majority of the respondents from *madiga* caste has no formal education.

Landholding and education

Table 3.13: Landholding and Education

Landholding	No formal Education	Primary	Secondary	Inter-mediate	Graduation	Above graduation	Total
Marginal	20	12	11	3	2		48
Small	11	5	10	3	1		30
Semi-Medium	1	3	7	3	1		15
Medium			1	1	4	1	7
Total	32	20	29	10	8	1	100

Table 3.13 presents the educational profile of the respondents along landholding. Out of 100 respondents 32 have no formal education. Out of these 32 respondents 31 belong marginal and small farmers category. Out of 20 respondents who have studied up to primary level twelve belong to the marginal farmers category, five belong to small and three belong to the semi-medium farmers category. Out of 29 respondents who have completed secondary education 21 belong to small and marginal farmers categories. Out of 8 farmers who have completed graduation four belong to the medium farmer category. Out of 78 respondents from marginal and small farmers categories 31 respondents (about 40 percent) have no formal education.

Caste and age

Data collected on caste was cross tabulated with age of the farmer respondents. Age was considered as an indicator of farmers' experience in cultivation. Age was also considered for data collection as to know to which caste do the young farmers belong. Data suggest that out of 100 respondents 35 are in the above 50 years age group (see Table 3.14). 32 respondents are in the age group of below 40 years. There are 33 respondents in the age group of 41-50 years. Although data collected from the respondents doesn't indicate a clear trend, it was reported by many respondents during the in-depth interviews that younger generation from SCs and some lower order castes from OBC castes are disinclined to engage in agriculture. This statement is supported by the fact that out of a total of 278 farmers in the village only 47 farmers are in the less than 35 years age group. 141 farmers are in the age group of 36 to 50 years. 90 farmers are in the age group of above 51 years. It was also reported that while the younger generations from the upper castes have disappeared from agriculture long back (about two to three decades back) the younger generations from SCs and low ranking OBC castes have now started abandoning agriculture. Apparently the younger generations from these castes prefer seeking employment in towns and are engaged in non-farm occupations like, masonry, daily wage labourer, etc.

Table No 3.14: Caste and age

Sl. No	Caste	Below 40 years	41-50 years	Above 50 years	Total
1	Chakali	2	1	2	5
2	Dudekula	1		2	3
3	Gowda	2	4	6	15
4	Madiga	7	9	9	25
5	Mala	3	3		6
6	Mangali			1	1
7	Mudhiraj	1	1	1	3
8	Munnuru Kapu	2	1	2	5
9	Reddy		2	1	3
10	Yadava	11	12	11	34
	Total	32	33	35	100

Table No. 3.14 showing the age contribution among the farming community in the village, there is a remarkable age gap in participation of farmers in the village. There are twelve farmers out of hundred farmers in the village. It shows that, there are less number of farmers entering into the farming in the village and in the case of *gowda*, *madiga*, *yadava*, *reddy*, *munnuru kapu* and *mudhiraj* communities youth are not attracting towards cultivation process in the village. At the age of thirty one to forty years age group farmers are twenty out of hundred in the village. By combining of both (20 to 40) age groups there are thirty two out of hundred farmers in the village. It means that, sixty eight farmers are fall under the above the forty years of age in the study village. There are thirty three farmers under the group of forty one to fifty years of age and this is the age group having largest number in the village farming community. There are thirty five farmers comes under the above fifty one years of age group in the study village. Total number of village farming community is 278. Among them, forty seven farmers falls under the less than thirty five age group. 141 farmers comes under the age group of thirty six to fifty years age group. Which means majority of the farmers falls under this group in the village. There are 90 farmers fall under the age group of above fifty years of age. From the above table

clearly indicates that, there is less number of young age farmers in the village. When its compares to the middle age and aged farmers in the village according to their farming experience in their cultivation process.

Experience in cultivation

Experience in cultivation indicates the depth of knowledge farmer has. Disposition towards various parameters of crop production is influenced by the experience in cultivation. It was assumed that farmers who have been cultivating for the past three to four decades must have witnessed changes in cultivation after the introduction of green revolution closely. They are also witnessing the changes taking place now. Thus, these farmers' understanding of cultivation practices and the rationale they offer would be different from the younger ones. Thus, data were collected from respondents about the years of experience in cultivation. Farmers were divided into three categories, namely young, middle level, and senior based on the years of experience in cultivation.

Table No. 3.15: Landholding and experience in cultivation

Landholding	Young	Middle level	Senior	Total
Marginal	7	24	17	48
Small	9	14	7	30
Semi-Medium	4	8	3	15
Medium		4	3	7
Total	20	50	30	100

Table 3.15 presents that there are 50 middle level farmers and 30 senior farmers. Middle level farmers are those who have cultivation experience in the range of eleven to thirty years. Out of these 50 middle level farmers 38 belong to marginal and small farmers categories. Out of 30 respondents who are categorized as Senior farmers (who have more than 30 years of cultivation experience) 24 belong to marginal and small farmers categories. There are only 20 young farmers among 100 respondents. 16 of them belong to marginal and small farmers categories. Although

the respondents were identified based on the purposive sampling strategy, experience in cultivation was not considered as a criterion in the selection of sample. Thus, it may be said that the younger generations from marginal and small farmers categories are disinclined to be engaged in agriculture.

Livestock

Animal husbandry is one of the important aspects of agriculture. For centuries, Indian agriculture witnessed close linkage between crop production and livestock. As cattle served the needs of farmers in cultivation, certain amount of status was also associated to owning cattle. Thus, farmers who owned more cattle were seen as rich when compared to those who don't'. Similarly, sheep rearing has been a common interest among farmers. As long as farming was not influenced by machines run on inanimate sources of power cattle were given special place in agriculture. A number of religious or seasonal rituals and ceremonies accord prominent place for cattle. However, over a period there has been significant change in the attitude of farmers towards cattle rearing. With the introduction of tractors and tractor drawn tools farmers have lost interest in cattle rearing. The other important contribution of cattle and sheep was the manure, which is called as farm yard manure. It was an essential part of cultivation as every farmer collected and applied farm yard manure in the field.

Table No. 3.16: Livestock holding across different castes

Sl. No	Caste	Cattle	Sheep	Goat
1	Yadava	70	500	200
2	Madiga	42	40	25
3	Gowda	38	20	9
4	Reddy	27		
5	Chakali	22		
6	Munnuru Kapu	22		
7	Mala	16	20	15
8	Dudekula	10	15	6
9	Mudhiraj	9		
10	Mangali	4		
	Total	260	595	245

Table 3.16 presents data on livestock population owned by the respondents along their caste. It may be observed that *yadava* caste respondents own more livestock than other caste farmers. 34 respondents from *yadava* caste own 70 cattle, 500 sheep and 200 goats. Similarly *madiga* caste respondents also own livestock but to a much lesser degree than *yadava* caste respondents.

Table No. 3.17: Experience in cultivation and livestock rearing

Age category	Cow	Sheep	Goat	Total
Young farmer	50	50	40	140
Middle Level farmer	135	200	105	440
Senior farmer	75	345	200	520
Total	260	595	245	1100

It was assumed that those farmers who know the importance of cattle and other livestock in farming prefer to rear cattle. Thus data collected from the respondents along experience in cultivation was cross tabulated with ownership of livestock. As presented in Table 3.17 senior farmers own more livestock than the other two categories of farmers. Although senior farmer respondents are only 30 they own 72 cattle, 345 sheep and 200 goats. They suggested that cattle are part and parcel of cultivation. They assert that even in the today's context which is witnessing rapid mechanization, cattle are relevant. They add that not only for meeting the

ploughing needs cattle and other livestock produce nutrient rich organic farm yard manure. It was reported by the senior farmers that farm yard manure is a soil and plant friendly when compared to chemical fertilizers.

This chapter discussed the socio-economic features of farmers of the study village and also of the respondents. Details of farmers along parameters like caste, land ownership, educational qualifications, years of experience in cultivation, etc. were presented. Data of the respondents were also presented with the similar features. Cross tabulations like caste and land ownership, caste and educational profile, land holding and educational profile, caste and age, caste and experience in cultivation, land holding and experience in cultivation, and livestock distribution along caste and experience in cultivation of the respondents provided greater insights into the cultivation patterns in the study village. The next chapter discusses the findings of observation and in-depth interviews with thirty respondents. This chapter attempts to capture the knowledge systems that are prevailing in the study village.

Chapter-IV

Agricultural knowledge system in the study village

The onset of commercial agriculture in the non-command areas placed demands on farmers to acquire appropriate knowledge so as to either benefit from the market led commercial agriculture or to escape unhurt from its vagaries. The demand for acquiring new knowledge made traditional, cumulative, community based knowledge available with the farmers not only irrelevant but also redundant. Modern technology based agricultural practices put pressure on farmers to enhance and upgrade their knowledge levels and acquire appropriate skills of cultivation. The village where the study was conducted has been undergoing a transition from conventional agriculture to commercial agriculture for the past two decades.

The present chapter focuses on the farmers' knowledge system that has been existing over the years, and it also discusses the changes occurring in the recent past. It describes the agricultural knowledge systems across different social categories and across different age groups of farmers. Data on the cultivation practices were collected from the respondent farmers in the village through in-depth interviews, observation and focus group discussion methods. Observation and focused group discussion methods were used to understand the present cultivation practices and to compare them with the practices recommended by the agricultural scientists.

Introduction

Agriculture is one of the oldest livelihood options for majority of human beings. 'Agriculture, which is the main economic activity of any state, is as ancient as human civilization. In fact, it is stated that civilization begun with the emergence of agriculture. Agriculture is defined as an art of cultivating land. Agriculture is the sector of human activity, between environment and human culture, which has grown

in and from it' (Lenka, 2000). Agriculture comprises a set of practices and technologies which manifest human understanding of nature. For ages, Indian agriculture has been dependent on certain methods of cultivation, the knowledge of which evolved over a period. Indian agriculture has been traditional in nature. 'During the British period, all efforts for agricultural reforms were made basically for raw material, which could be made available in bulk from India, to increase production in mills in Britain' (Government of India, 2011). Entry of green revolution in 1960's changed the cultivation practices significantly. Knowledge on new ways of cultivation and about the usage of new technologies became critical in the changed circumstances. One of the critical factors that has emerged in the process of change is agricultural knowledge. More importantly, dissemination of new knowledge became key in agriculture.

Dissemination of agricultural information

Dissemination of agricultural information to farmers is considered as the prime responsibility of the state. The state plays a major role in formulating agricultural policies and allocation of funds for the growth of agriculture in India. It formulates policies, programs which are implemented by the federal governments. Agricultural extension, which deals with the dissemination of agricultural information, supports farmers and facilitates the transfer of technologies and attempts to solve problems related to productivity.

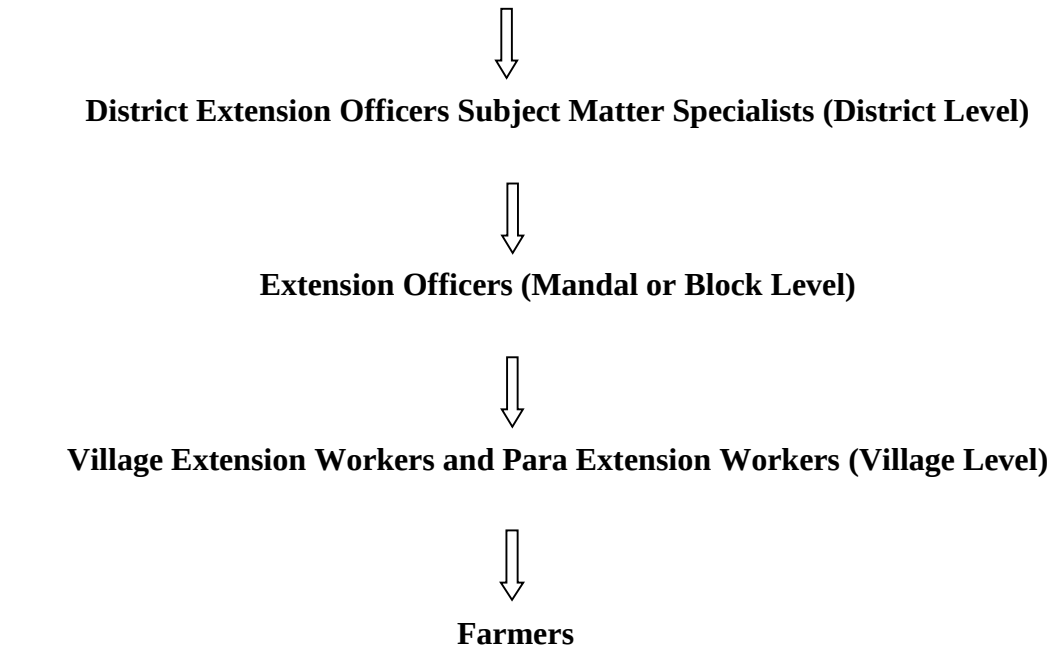
Scientific research in agriculture in India got impetus with the establishment of the Imperial Council of Agricultural Research (ICAR) in 1929 (after Independence it was renamed as Indian Council of Agricultural Research) on the recommendations of the Royal Commission on Agriculture. ICAR is the apex body for managing, coordinating and guiding research and education in agriculture and its related areas in the country. ICAR is fully funded by the Union Government of India.

In India, special attention was paid to the development of agricultural research infrastructure immediately after Independence. At the national level, ICAR supports agricultural research and extension services for effective transfer of technologies to the farmers. It coordinates agricultural research and development programs and develops linkages at national and international levels with related organizations to improve the productivity of crops.

ICAR has established various research centres in order to meet the agricultural research and agricultural educational requirements of the country. It is actively pursuing human resource development in the field of agricultural science by setting up numerous Agricultural Universities across the country. It established Krishi Vigyan Kendras (KVKs), which are responsible for training, research, and demonstration of improved technologies to farmers. There are 53 Agricultural Universities, 47 Research Institutes, 6 National Bureaus, 17 National Research Centres, 25 Directorates/ Project Directorates and other Allied Departments. These institutions are working towards the betterment of agriculture conditions in the country.

During the First Five Year Plan (1951-56) the Government of India launched the Community Development Program (1952), followed by the National Extension Service (1953) programme. These programmes aimed at over all development of rural areas by promoting agriculture through improved methods of cultivation. Other programs like Intensive Agricultural District Program (IADP) in 1960, Intensive Agriculture Area Program (IAAP) in 1964 and High Yielding Varieties Program (HYVP) in 1966 besides Farmers Training Centres (1967) were also launched to train farmers on new methods of cultivation.

Figure. 4.1: Dissemination of agricultural information at the state level



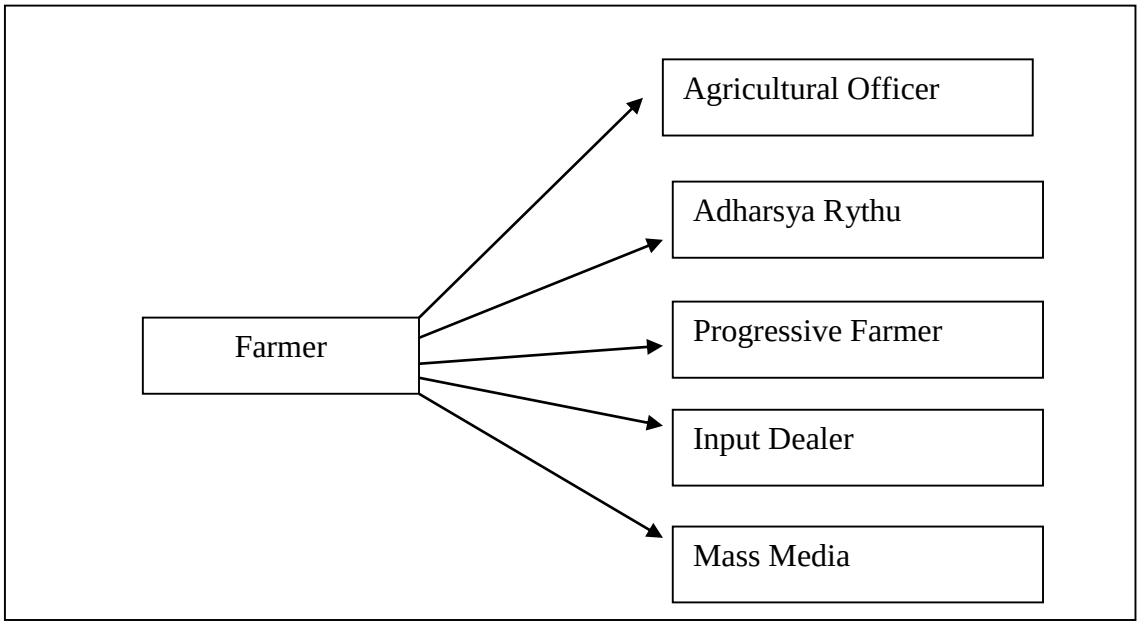
Source: Claire J. Glendenning, 2010.

Typically, knowledge on new technologies flows from top to bottom to farmers in the form of agricultural information. Such knowledge is developed by the agricultural universities and research centres and is called as scientific knowledge. Scientific knowledge is transmitted to the state department of agriculture which takes up the responsibility of transferring it to the farmers. Agricultural information is received by district extension officers who in turn disseminate it to the Mandal or Block level extension officers. Extension officer at the Mandal or Block level, known as Agricultural Officer, disseminates such information to the farmers at the village level through the village extension workers.

Sources of agricultural information at the village level

Flow of agricultural information at the mandal level to the village level can be discussed under two broad categories, 1) Formal or Institutional and 2) Informal or non-institutional sources. As the agricultural sector has been formalized more and institutionalized further (from the seeds, fertilizers etc.) agricultural information has become informal or left to the market forces. However, in the absence of assured market in rural areas, it is difficult to expect a fair market mechanism that allows the flow of right or appropriate agricultural information to the farmers. The absence of regulatory bodies over agricultural market manipulated priorities.

Figure. 4.2.: Sources of agricultural information



The different sources of agricultural information available to the farmers in the village are the agriculture officer, progressive farmer (farmer who has large extent of land and who hails from the dominant caste), Adharsha rythu, input dealer, and fellow farmer. The information received by the agricultural officer is passed on to the progressive farmers or adharsha rythu of the village who are expected to pass

the same to the farmers in the village. Along with the official flow of agricultural information input dealer (who sells agricultural inputs like seeds, fertilizers and pesticides through a shop) also plays a crucial role in passing the agricultural information to the farmers in the village.

Table No. 4.1. Sources of agricultural information

Sources of Information	Category of farmers				
	Marginal	Small	Semi-Medium	Medium	Total
Agricultural officer	2	1	7	7	17
Adharsha Rythu	2				2
Progressive Farmer	19	7			26
Input dealer	17	20	6		43
Mass media	2	2	2		6
Not receiving from any sources	6				6
Total	48	30	15	7	100

Table 4.1 presents the data on the different sources of information available to the respondent farmers in the study village. The different formal sources of information are Agricultural officer, Adarsha Rythu and mass media (TV or Radio), and the informal sources are progressive farmers and input dealers. Importantly, the input dealer has emerged as the main source of information available to the farmers in the study village. Next important source of information is again located in the informal domain, i.e., progressive farmers. It may be observed that the formal sources of information are less accessed by the respondents when compared to the informal sources. In the ensuing part the nature of different sources of information are discussed in detail.

Agricultural Officer

Agricultural Officer (AO) at the Nellikudur Mandal headquarters is the main source of formal information to the farmers in the village. Agricultural Officer is the

administrative Head of the agricultural extension at the Mandal level. The AO is assisted by five Agricultural Extension Officers (AEOs). The key functions of the AO and the AEOs are to disseminate information to the farmers on modern cultivation practices, agricultural inputs, problems in cultivation like pest and disease infestation, availability of seeds, fertilizers, and issues related to marketing the produce.

The role of the Agricultural Officer is to send daily reports to the higher authority about the agricultural conditions in the mandal. Agricultural Officer has to visit all the villages which come under his/her purview or jurisdiction. In Andhra Pradesh there are fewer extension workers than other states. In a state like Maharashtra and West Bengal, Agricultural extension officers are provided for every 3-4 villages and in Karnataka 800 to 1200 farm families are covered by one extension functionary. However, in Andhra Pradesh, an AO has to cover 10-15 villages or more than 3700 families. *'Practically, it is very hard for me to keep in touch with all farmers at the mandal level. One person cannot justify thousands of farmers' needs within the mandal level'* says the Agricultural Officer.

Farmers in the village believe that, as reported by a farmer '*as part of his duties the Agricultural Officer has to be available to us whenever we visit his office. Unfortunately, it is not so. We see him only during the farmers' meetings. He seldom visits our fields'*. Vasireddy Yadhagiri Reddy, 45 years age, medium landholder, with 20 years of experience in cultivation, who has completed intermediate, says that 'he is in regular contact with the Agriculture Officer either over phone or in person to seek advices or to get information about problems in cultivation'. *'I then pass on this information to other farmers, whoever needs my suggestions in the village'.*

Oridholu Yakhaiah**,** 40 years of age, a semi-medium land holder, belonging to *yadava* caste (one of the OBC castes in the village), with 18 years of experience in cultivation, who studied up to 7th class, reports that he was the one who introduced Bt cotton in the village. '*Since cultivation of BT cotton requires different set of practices from that of hybrid cotton I began consulting the Agricultural Officer to seek his advices. I believe that the AO has more knowledge than me. I have no prejudices which other farmers in village have. Because of the prejudices they don't approach the AO. But I believe that for growing commercial crops we need to seek advices from the experts like AO who knows better than us'.*

Oridholu Yakhaiah**,** 40 years of age, semi-medium land holder belonging to *yadava* caste (one of the OBC castes), with 18 years of experience in cultivation, who studied up to 7th class, stated that *I have nine acres of land (four acres irrigated land and five acres dry land). I've not learnt the cultivation of commercial crops from any one. I didn't get any training or guidance from the agricultural officer or progressive farmer also. But I've acquired the knowledge from my relative who lives in Khammam. For the last five years onwards I've started consulting the Agricultural Officer about the cultivation of commercial crops. I believe that the Agricultural Officer has more knowledge than what I have. If I don't approach him I will not get knowledge for better cultivation. Most of the farmers in the village are not willing to share their problems, because they fear about their prestige.*

Among the 31 respondents from the Scheduled Castes (both *Mala* and *Madiga*), only one farmer reported to be accessing information from the AO. Shivarlla Badhraiah, 49 years of age, a small farmer and the first Dalit Sarpanch, during 2006-2011 (elected president of the village in the gram panchayat elections) observes that '*accessing information from the Agricultural Officer is difficult for marginal farmers. Due to the small size of their holdings and their low caste position in the society the Dalit farmers don't approach the AO. Because of their low social*

and economic status, they don't open their mouth in the interactions with other farmers in the village during informal discussions in the common places'. He further observes that 'it is a fact that the AO neither visits the fields of farmers nor present in his office'. *Whenever we call him, he says that he is outside the town (mandal headquarter, from where he is supposed to function) on the department work or in a meeting with the higher officials or visiting other villages. I called several times to enquire about crops which fetch good price in the market, the problems in cultivating such crops. Even when he is available over the phone he gives very short answers which, in fact compound our confusion. Because of this, many Dalit and marginal farmers in the village depend on the input dealers who are available throughout the day at Nellikudur (mandal head quarter).*

Due to the non-availability of the Agricultural Officer farmers depend on other sources like input dealer and progressive farmers. Farmers belonging to the upper castes and those who have relatively large holdings have social capital and also can afford to maintain good social networks. Because of this they can access all the benefits of the state, like subsidy seeds, fertilizers, pesticides, machinery, equipment, etc. They always derive the advantage of timely sowing, better crop management, and even of selling the produce at a better price than the farmers who are socially and economically poor.

Adharsha Rythu

Adarsha Rythu, the Telugu phrase stand for 'model farmer'. As per the recommendations of the National Commission for farmers headed by Prof. M.S. Swaminathan, to adopt the Model Farmer approach, Adarsha Rythu system was introduced in Andhra Pradesh in the year 2007-08. The state of Andhra Pradesh, taking cue from the recommendations of the National Policy for Farmers implemented the agricultural extension programmed called *Polam Badi* (which

means Farm School) with an aim to increase the awareness levels among farmers about the improved practices in cultivation. Along with this programme it appointed *Adarsha Rythu* in each village in the state. Through *Adarsha Rythu* the state believed that the agricultural practices of farmers would be improved. It envisioned that *Adarsha Rythu* would act as a bridge between the slender and almost defunct extension services at the mandal level with the farmers. The main objective behind the identification of *Adharsha Rythu* was to introduce a nodal functionary between the farmers and the extension staff of agriculture and other line departments to help in bridging the gap between the scientific know-how and field level do-how (Department of Agriculture, 2012-13).

Thus the basic task of the *Adarsha Rythu* is to disseminate knowledge about the cultivation practices which are in tune with the modern commercial agriculture. About 50,000 *Adarsha Rythus* were appointed by the state of Andhra Pradesh in the year 2007-08 (Department of Agriculture 2012-13). By the time the thesis was being finalized the programme has been terminated in both the states, namely, Telangana and Andhra Pradesh. The reason for the termination are reported to be political as the governments in two states believed that the *Adarsha Rythu* was appointed by the erstwhile Congress government and that it was more interested in deriving political advantage rather than making agricultural information available to farmers. The *Adharsha Rythu* was appointed in each village or at the rate of one *Adharsha Rythu* for every 200 to 250 farmers. *Adharsha Rythu* disseminates the agricultural knowledge and information received from the AO to the farmers in the village. The *Adarsha Rythu* is paid a monetary incentive of Rs. 1,000/- per month. Apart from this *Adarsha Rythu* also derives advantage of being recognized as a political leader in the village as he has the access to the AO and the benefits that the state provides to farmers, like subsidized seeds, equipment, or other schemes like drip irrigation, etc.

There are two *Adharsha Rythulu* (plural form of *Adarsha Rythu*) in the study village as there are more than 250 farmers in the village. *Yasam Yakhaiah,* 43 years of age, belonging to one of the OBC castes - *Munnuru Kapu* and *Arupula Yakhaiah,* 45 years of age, belonging to Scheduled Caste – *Madiga,* are the model farmers in the village. However, farmers in the village see these appointments as political. As these two farmers owe allegiance to the ruling party they have been selected as model farmers. The functioning of the *Adarsha Rythu* in the village was found to be ineffective. In the words of *Yasam Yakhaiah*, one of the *Adarsha Rythulu, 'no farmer in the village approaches me for information on cultivation and related problems. They only ask me about the government schemes or relief funds (during natural calamities)'.* This is because farmers in the village don't have great impression about *Adarsha Rythulu* appointed for the village. They observed that *Adarsha Rythulu* of the village don't know about cultivation. '*Being active members of the ruling political party these two were made as Adarsha Rythulu',* observed a farmer.

Progressive farmers

The invention of green revolution paradigm is 'progressive farmer'. One of the ideological bases of green revolution was reaching out to the progressive farmer of the village so that new technological knowledge would trickle down to other farmers of the village and of neighboring villages. We also witness the privileging of progressive farmer in the diffusion of innovation literature. The first category of farmer in the diffusion of innovation is the innovators. The diffusion of innovation literature suggests that the innovators are necessarily the progressive farmers. Thus, progressive farmers are those who are large landholders, belonging to the upper castes and dominant castes in the village, risk taking, open to fresh ideas, first to adopt new technologies, who have shown significant performance in terms of higher crop yields in his farm when compared to other farmers in the village.

In the non-command areas where green revolution reached in the recent past, progressive farmers are the ones who adopted green revolution based cultivation practices. For example, in a typical non-command area village the first farmer to adopt HYV seeds, chemical fertilizers, pesticides, weedicides, machine for cultivation like, tractors, weeders, sprayers, cultivators, harvesters, etc. is the progressive farmer. It is important to note that those farmers who could afford to adopt commercial agriculture in non-command areas belong to upper castes or dominant castes and hold relatively higher acreage of land in the village. Because of their risk taking ability and experimenting with new cultivation technologies they have become close to the extension personnel of the state at the mandal level. Because of their proximity to the power circles these farmers emerged as progressive farmers.

Other farmers in the villages consider the progressive farmer as the one who has rich practical experience and knowledge about different components of modern cultivation practices. Other farmers who typically belong to lower social strata, small holdings, and who cannot afford to take risks approach the progressive farmer on seeing the success in his field. The success of a farmer is evaluated in terms of higher yields and higher productivity disregarding the increased cost of cultivation. As and when these farmers approach the progressive farmer, the latter is more than willing to advise as it derives prestige in the village and across villages in the region. Progressive farmers also have political leanings, but not in a direct sense. Brother or other close family members will develop political relations, for which the prestige of progressive farmer adds political weight.

In the study village there are three Progressive Farmers who belong to the *Reddy* caste. About nineteen respondents (fourteen marginal and five small) reported that they approach the progressive farmer for seeking information and getting help in buying seeds, fertilizers, pesticides and selling of their product in the market. It

was observed that a significant number of respondents (26 out of 100) takes the help of a progressive farmer in buying the seeds for cultivation or ask the progressive to buy seeds for them. Farmers reportedly believe that the progressive farmer purchases high quality seed, hence the quality is guaranteed. It is of importance to mention that most of the times progressive farmers act in a trusted manner as any failure of seed casts a dent on their image in the village. Hence, progressive farmers are different from input dealers as they don't derive any monetary gain from helping farmers in buying inputs but their recognition in the village. It may be said that the relationship between the progressive farmers and others is a non-commercial and non-exploitative to a great extent. It is purely social and embedded in prestige in the village and in some cases with political power.

Farmers belonging to lower social strata (*yadava, gowda, madiga* and *mala* castes*)*, with small holdings, in their middle or old age approach the progressive farmers. Interestingly, young farmers, even from these castes don't show much interest in approaching the progressive farmers. Bonthala Yakhaiah, 63 years age, a small farmer from y*adava* caste with 32 years of experience in cultivation observes that,

> *'for several years Dora (referring to the progressive farmer who belongs to Reddy caste) has been buying agricultural inputs for me. I believe him and request him to buy seeds, fertilizers and pesticides for my cultivation needs. I approach him when he goes for buying the inputs from the mandal headquarters, and he, generally, obliges. If I have money I give him in advance or else I pay him later'.*

Another respondent, Maiah Illaiah, 60 years of age, marginal farmer from *mala* caste suggests that,

'for more than 15 years I worked in Dora's farm as an attached labour. Even now I work for him whenever there is work in his fields. Because of this acquaintance he helps me in buying fertilizers, pesticides and seeds. Even if I don't have sufficient money, he brings them for me. Many farmers in the village told me that they were cheated by the input dealers when they bought seeds or fertilizers on their own. But Dora never cheated me till today. Whatever he brings for himself, he also brings for me'.

As progressive farmers in the village belong to senior age category there appears to be a divide along age as younger generation feel that they are better off in terms of knowledge of cultivation than the progressive farmers. It was observed that young farmers believe that the practices of progressive farmers are traditional and not scientific.

Input dealer

Input dealer is the one who sells products that are used in cultivation. Seeds, fertilizers, pesticides, herbicides, growth and pest control products, bio-fertilizers, etc. are sold by the input dealers. What once used to be procured by the farmers in their own villages, now are being sourced from the input dealers. The input dealer is a person who runs it on a commercial motive seeking a percentage gain from the sale proceeds. S/he could be one who is capable of maintaining stocks in the store, handling cash and dealing with farmers. This implies the fact that the person need not be familiar with cultivation. Although some farmers turned as input dealers, in most of the cases the input dealers are those who are young, seeking profits by engaging in market related activity. The input dealers have to procure license from the Department of Agriculture for setting up the shop. They have to work as per the guidelines of the Department of Agriculture enforced at the Mandal level by the Agricultural Officer. The Agricultural Officer is responsible for controlling the sale

of spurious seeds, fertilizers, pesticides. Unauthorized products are also checked by the Agricultural Officer. Sometimes, the government subsidies are routed through the input dealers. Particularly, in the case of fertilizers the input dealer provides fertilizers on subsidy by claiming the difference from the state. Thus input dealer has emerged as the important linkage between the state and farmers as well.

Over the years, the private companies engaged in inputs for agriculture have started using the services of the input dealer for pushing their products. By offering attractive margins (in terms of percentage) and other benefits similar to that of, for example, consumer durables, over the sale proceed the private companies have been keeping the input dealer in their control. Today, agricultural input market is one of the competitive markets, albeit besieged with problems of manipulation, malware and illegal practices. As the input dealer is interested in making more profit s/he seldom bothers about the veracity of the product being sold. In a way it may be said that input dealer has emerged as the important linkage between farmers on one hand and the state Department of Agriculture and the private companies on the other. However, it was observed in the study that the control of private companies is more about the input dealer than the state. In fact, the input dealers attempt to circumvent or by pass the regulations of state for seeking more profits.

What is important from the point of view of the present work is that the input dealer has emerged as the important source of information to the farmers in the village. In the absence of state extension services or because of the limitations of the state extension services farmers have started relying on the input dealer like never before. In fact input dealer is the primary source of information to the farmers. It was observed in the study that a majority of the respondents (43 percent) source information from the input dealers. A large majority of the marginal farmers (about 35 percent) and small farmers (about 67 percent) approach the input dealer for suggestion at the time of buying the product, whether to control a pest or disease or

about the quality of seed or fertilizer. Interestingly, none of the medium farmers among the respondents rely on the input dealer for making a decision about cultivation. As the Agricultural Officer and other state functionaries of extension are inaccessible to the small and marginal farmers it may be said that the input dealer has emerged as the alternative source for these sections of farmers. Not only that the input dealer is available for most part of the day and the season, credit purchases are also offered to the small and marginal farmers. The input dealer provides inputs on credit, which is recovered after the harvest with a high interest rate.

It was observed in the study that the farmers, particularly the marginal and small, do not have a very good opinion about the information provided by the input dealers. At least five marginal farmers and two medium farmers suggested that they were either misinformed amounting cheating or disillusioned by the input dealers. *Akula Sarvaiah*, 48 years of age, medium farmer belonging to the *yadava* caste, narrated his experience of buying seed from the input dealer at the Nellikudur (mandal headquarters),

> "*while buying the paddy seeds, the input dealer said that the brand of seeds is of good quality as it was a new seed variety which gives high yield and has higher resistance to certain pests. He even gave me hundred percent guarantee for the seed, saying that it would fetch good yield. On his advice, I bought that brand of seeds and sowed. But the seeds never geminated even after taking care of the nursery well. When I went and asked him about the non-germination of the seeds and demanded compensation the input dealer blamed me saying that I didn't know how to cultivate and the problem lies with my field. He even said that there is no complaint against that brand of seeds though it was sold to many farmers. What I understood from his words was that he was blaming me and my field, rather than owning up the*

responsibility. In what way could I check with other farmers about the quality of that brand?'

The transactions with the input dealer and the farmers are based on trust. Most of the respondents observed that they go to a particular input dealer who is trustworthy when compared to others. Trustworthiness and allowing credit purchase are the two factors influencing farmers in choosing a particular input dealer. In some cases, farmers resign to their fate when the particular inputs like seeds or pesticides fail to perform. It was clearly evident in the field that the input dealers are in unison in reacting to the issues of failure of seed or pesticides. They all blame the farmer for his/her lack of knowledge in the usage of the input. They throw the blame on the farmers' inability to understand what they (the input dealers) have said at the time of sale of the input about its usage. It was observed that farmers do take this blame thinking that it is their lack of knowledge that caused the failure of input. Even in the cases where farmers are aware of the spurious nature of seed or pesticide and dubious act of the input dealer they seldom claim compensation from the input dealer. As mentioned, a large majority of the farmers who take advices from the input dealers are marginal and small. Because of the lack of social capital and political power they don't act against the dubious practices of the input dealers. However, it was observed in the field that, when an input fails to perform the farmers belonging to upper castes and medium category claim compensation from the input dealers.

Mass media

In the context of globalization agriculture in the country witnessed tremendous changes. Changes which directly influence the farming community are related to subsidies on fertilizers, seeds, etc. The declining role of the State in agriculture is also felt by the farming community. The indirect impact of

globalization is felt in the opening up of agriculture market to the private players. This resulted in a plethora of products being offered to the farmers by a multitude of agricultural input producers. For example, seed sector has been under the control of the State for a long time. The State, through its Agricultural Universities, and research stations used to develop the seed and market through its outlets or through private breeders. Presently, the private breeders procure the genetic material from sources outside the State sector and with the permission of the state sell them to farmers. As a result a multitude of players entered the agricultural input market in the last two decades. Similarly, in the case of pesticides and fertilizers we witness a number of products being offered to farmers. As the market became highly competitive the companies have started engaging the mass media through advertisements. Both electronic and print media advertisements conveying the message of high to bumper yields through depiction of gold coins flowing out of farm output or Goddess *Lakshmi* bestowing benevolence on the farmer who uses a particular seed or pesticide is a common sight. In the absence of regulations and control over such advertisements farmers have been attracted to them.

In this sense, the role of mass media has changed significantly over the past two decades as it became a medium of not just dissemination of agricultural information, but also a medium for marketing the product of the companies. However, on the other hand it may be said that the cable revolution in the country enhanced the number of channels, both regional as well as national, both state owned and private. As a large mass of audience are located in rural areas and engaged in agriculture a number of local vernacular channels began airing farm related programmes every day. Thus, it may be said that the coverage of agricultural news from the mass media, particularly the electronic media has increased significantly in the past two decades. As far as Telugu electronic media is concerned, channels like Etv3, Maa TV, CVR TV, V6, T News, etc. have been producing programmes on

modern agricultural practices, and technologies. The aim of these programmes has been to educate farmers about the best management practices which help in augmenting the yields. Discussions with the Scientists and Subject Matter Specialists are broadcast live for the benefit of farmers. Most of the channels broadcast the programmes on agriculture in the morning and evening time. Apart from the electronic media, print media also has been giving agricultural related news. Vernacular papers carry special features every day on agricultural information which includes animal husbandry as well.

When ascertained about the extent of reliance on mass media for agricultural information from the respondents, it was found that a small number of farmers (six percent) consider the mass media as a source of agricultural information. Informal conversations with farmers during the field work revealed that farmers find the content of agricultural information broadcast in the television channels irrelevant in their contexts. They feel that the practices recommended in the shows are impractical or not practical in their field conditions. It was pointed out by the farmers that the recommended practices are aimed at those farmers who have greater economic capacity and capacity to take risks. Thus, they observe that the recommended practices are not suitable in small and marginal contexts. Some small and marginal farmers observed that even though certain practices are appropriate in the small and marginal holdings, farmers don't practice them as sufficient further information is not available readily from other sources. For example, the System of Rice Cultivation (SRI) is most suitable at the small and marginal farmer's level as it is based on the concept of low water usage in the cultivation of paddy. SRI also assures higher yields when compared to conventional mode of paddy cultivation. Such information is broadcast by the television channels frequently, but farmers don't find other sources such as Agricultural Officer, or Progressive Farmers providing further information or to clarify their doubts. One of the farmers responded that '*had there*

been sufficient information on SRI, I was interested in its adoption. But no one has taken up in our area and hence I don't know the details of it'.

Agricultural knowledge and information sharing

To understand the prevalence of knowledge of cultivation in the open community space, data on the patterns of sharing agricultural information and knowledge were collected from the respondents. Those practices that prove successful often get into the public domain within the village as farmers in the village discuss the stories of success as well as failures in the village. Thus, farmers in the village develop some level of understanding about the successful practice and try to adopt them in their fields. However, the problem here is that to what extent such knowledge is shared between farmers across caste and class categories. In order to understand the issue of sharing agricultural knowledge, respondent farmers were asked whether agricultural knowledge is shared.

Table No: 4.2: Sharing of agricultural knowledge information

Category of farmers	Yes	No	Total
Marginal	12	36	48
Small	6	24	30
Semi-Medium	8	7	15
Medium	7		7
Total	33	67	100

It may be ascertained from Table 4.2 that out of hundred respondents sixty seven do not share the information or knowledge with other farmers in the village. Among these sixty seven farmers who don't share, a large majority (54 percent) belongs to marginal category and 36 percent belong to small farmers' category. It is important to note that 75 percent of marginal farmers (36 out of 48), and 80 percent of small farmers (24 out of 30) don't share information. On the other hand a large majority of the medium and semi-medium farmers share information with other

farmers in the village. Further probing on the patterns of sharing agricultural information and knowledge revealed that medium and semi-medium farmers belonging to castes like *yadava, reddy,* etc. share with other farmers in the village. Another important observation of the study is that most of the young farmers are open to sharing information and knowledge with other farmers when compared to farmers belonging to senior age groups.

In the evolving agrarian relations the role of community is declining as individuation in increasing at a fast pace. Farmers in the today's context rely on information and knowledge sources which lie outside the village rather than relying on the sources within the village. As the community knowledge is claimed to be becoming irrelevant farmers appear to be disinclined to share knowledge with fellow farmers. Increasing importance to non-food crops, commercial cultivation, and market linked production strategies have overtaken the practices which evolved within the community over a period in the village. But what is important to note here is the absence of information and knowledge sharing among farmers, particularly those belonging to small and marginal categories. It was observed by the researcher that anxieties of farming, for example, getting higher yields than other farmers, risks associated with advices or suggestions, incomprehensible practices (in the case of Bt cotton, farmers don't understand the scientific basis of insecticidal properties of the Bt cotton seed) are contributing to the poor levels of knowledge and information sharing between farmers. It is also pertinent to mention the declining public, open spaces in the villages for the farmers to assemble. Even if the space is available, it was observed in the village that, the farmers' daily routines during the crop season are controlled by the electricity supply to the agricultural pump sets.

With the restructuring of the electricity sector in Andhra Pradesh, which began during the tenure of the Telugu Desam government (initiated in 1990s) on the dictates of the funding body World Bank the power supply to agriculture has

completely changed. Owing to severe power shortages, successive governments since 1990s began supplying power to irrigate fields as per the availability of power. As a result, most of the villages in this part of the state get seven hours of power supply in two schedules per day. These schedules are one in the early morning (between 3:00 AM to 7:00 AM) and next, late in the night (9:00 to 12:00 PM). These schedules are not constant and keep changing. But most of the time the schedules are placed at odd hours. In such disarray farmers find it difficult to meet each other and engage in conversations at public places.

Rythu Mitra - New forum for farmers

Rythu Mitra is one of the state initiated programmes aimed at all round development of farmers. Under this programmes farmers of the village are encouraged to form collectives, popularly known as Self Help Groups (SHGs). Members of the Rythu Mitra include farmers (owner cultivators) tenant farmers, sharecroppers and oral lessees. It facilitates not just dissemination of agricultural information, distribution of state subsidies, but also credit from banks. Each group consists of 10 to 15 members who strive to serve their common interests. There are about 2,00,000 Rythu Mitra groups in Andhra Pradesh (Agriculture & Cooperation Department, 2002). There are about 10,605 Rythu Mitra groups formed exclusively by tenant farmers.

This group functions as the interface between the Agricultural Extension system and Farmers for transfer of technology, access to market information and other farm related advices. This group take up different development activities like, soil testing camps, animal health camps, arranging expert's lectures in agriculture besides taking up social activities. It also liaises with agencies such as financial institutions, market yards, media etc.

In the study village, 220 farmers have been registered in 22 Rythu Mitra groups. But only eight groups are actively functioning as on date. Among the eight groups six groups consist of young farmers and two groups are formed by farmers who are in their middle ages. It is not that age is the criterion for forming the group, but it was observed that young farmers prefer to be associated together than with senior farmers. Apart from age, caste also appears to be playing a role in the formation of groups. It was observed that one group is led by a farmer from the *reddy* caste and another by a farmer from the *gowda* caste. It was told that in 2012 each group was given a loan of Rs. 2,00,000 which was shared by members of the group. It was also suggested by members and other farmers in the village that due to lack of active leadership among the members of the group farmers could not put the loan provided by the state for better use. It appears that most of the farmers spent it in repaying the loans they took from money lenders or relatives. It may be said that the money was not used for betterment of agriculture.

Credit

As agriculture attained commercial overtones in the village since a decade credit requirements of farmers have increased manifold. Regional rural banks and other nationalized banks also have been focusing on lending loans to farmers. The extent of loan disbursal by the nationalized banks has increased in the post-liberalized scenario. It may be said that penetration of banks in rural areas, particularly farmers (only owners of land) have increased significantly over the years. The trend may be ascribed to the wider changes in the agriculture sector in the country.

It was observed in the study that every farmer in the village has taken loan from banks. State Bank of India (SBI) provides short term, medium and long term loans to farmers. However, farmers observe that loans to the farmers are not given

at the appropriate time. *Akula Isthari,* aged 48 years, a marginal farmer belonging to *yadava* caste suggests that,

> *'banks take lot of time to sanction loans to farmers and we have to approach again and again. Farmers who pay some percentage of commission to the bank's staff get loans immediately. We take loans by pledging 'bhoomi patta' (Pass Book issued by the revenue department that contains the details of land holdings of the farmer). Loans start from Rs. 5,000/- to Rs.10, 000/- per acre and it varies from farmer to farmer. Farmers who use influence through their networks based on caste or land holding get more loan than others who don't have such influence'.*

The informal credit sources also are used by the farmers along with the institutional credit sources. Fellow farmers, money lenders, relatives are the informal sources of credit (see Table 4.3). The interest rate is Rs.3/- per hundred per month. It was reported that two years back it was Rs.4/- or 5/- rupees, but due to state intervention which imposed restrictions on the interest charged by the informal sources the rate of interest has come down. The informal credit sources flourish mainly because banks don't lend in time.

Table No.4.3: Sources of credit

Name of the source	Marginal	Small	Semi-Medium	Medium	Total
Bank	8	17	9	7	41
Money lenders	30	9	5		44
Fellow farmer	6	2			8
Relatives	4	2			6
Not taken loan			1		1
Total	48	30	15	7	100

Table No 4.3 explains the different sources of credit available to the farmers. 41 respondents out of hundred receive loans from the bank and most of them are

extending or re-writing loan amount for the next crop. Out of forty one, eight are marginal farmers, seventeen are small farmers, nine are semi-medium and seven are medium farmers. Money lender is the biggest credit provider to the farmers. Money lenders hail from the *komati*, g*owda* and *yadava* castes. It may be said that the availability of institutional credit is still difficult for the small and marginal farmers. Due to the non- availability of credit from bank, many small and marginal farmers approach money lenders or traders. Getting loan from different sources depends upon how the farmer is able to approach. Meidum and semi-medium farmers are easily accessing loans from the bank, while other farming categories (small and marginal) are unable to get the loan from the bank because they need to make several visits to the bank (which is not possible due to their work at the beginning of the cultivation process).

This chapter explains the farmers' knowledge systems in their cultivation process. With the advent of the science and technology in present days agriculture practices that turns to update their new cultivation methods. For that farmers needs to adopt and learn new methods to practice in their fields to which farmers need information on new methods and techniques. This chapter explains about the source of agricultural information to the farming communities in the village and sharing of agricultural information and accessing credit among the farming communities in their cultivation process. This chapter is the key to the next chapter which deals with the cultivation practices the farmers adopt.

Chapter-V

Change and continuity in cultivation practices

The present chapter discusses the patterns of change and continuity in cultivation practices through an intensive study of the cultivation practices in the study village. Apart from the data collected from hundred respondents and the in-depth interviews with thirty respondents, researcher's close observation of farm practices and engagement with farmers over informal conversations, and by living in the village for a considerable period provided rich insights into the cultivation practices. The study carried out with an objective to understand the changing cultivation practices, owing to changes in the knowledge forms observed that cultivation practices have been undergoing varied changes among farmers in the study village. The social factors leading to varied adoptions, sociological reasons for the presence of multiple knowledge systems, and the resulting technological frame which guides cultivation practices are delineated in the present chapter.

Cultivation practices undergo changes owing to several social, economic, political and technological reasons. A watershed in the changes in cultivation is the introduction of green revolution in the country. The green revolution paradigm which valorised the usage of HYV seeds, chemical fertilizers, irrigation facilities, etc. radically altered the long held notions of cultivation among farmers. Changes in the notions on cultivation among farmers are reflected in the practices they adopt in cultivation. The study made several important observations about changes in the cultivation practices. The varied changes are discussed under several heads below.

Cropping pattern

Cropping pattern refers to the proportion of area cultivated under various crops at a point of time. It changes with space and time. The cropping pattern of a region is influenced by the agro-climatic, socio-economic, historical and political

factors (Hussain, 1976). Forms of crop land use of a region are the manifestation of the combined influence of physical and human manipulation. It also depends on the terrain, topography, slope, soils and availability of water for irrigation, use of pesticides, fertilizers and mechanization. More importantly it also depends on the socio-cultural bases of knowledge. It is a dynamic concept because no cropping pattern can be said ideal for all times to a particular region. It varies in space and time and is ruled by the physical as well as cultural and technological elements. The change in cropping pattern in a particular span of time clearly indicates the changes that have taken place in the technological, physical and cultural aspects of cultivation. 'In most of the situations, the physical environment reduces the choice of certain crops altogether or by reducing their level' (Morgan and Munton, 1971). However, at the farmer's level, potential productivity and monetary benefits act as guiding principles while opting for a particular crop or cropping system. The decisions with respect to the choice of crops and cropping systems are influenced by several other forces related to infrastructure facilities, socio-economic factors and technological developments, all operating interactively at micro-level. Green Revolution involves the use of seeds of high-yielding varieties (HYVs), primarily of wheat and rice, and the adoption of a package of improved agricultural practices involving fertilizers, pesticides, controlled irrigation, credit, agricultural machinery, etc. These changes were instituted in place of the traditional agricultural practices involving the use of seeds whose genetic makeup goes back to thousands of years (Parayil, 1992).

Cropping pattern in the study village

Village revenue records suggest that the total cultivable area of the village is 1,550 acres, out of which 1,143 acres of land is cultivable. 1,143 acres include 740 acres of dry land and 403 acres of irrigated land. Farmers cultivate multiple crops like Paddy (*Oryza sativa*), cotton (*Gossypium Sp*), turmeric (*Curcuma Longa*),

mirchi (*Cadsicum Anmum*), groundnut (*Arachis Hypogoca*), and maize (*ZeaMays*). Table 5.1 presents crops cultivated by farmers in the study village.

Table No 5.1: Major crops cultivated in the village

Crop	Area under cultivation in acres (percentage of area to the total area cultivated)	No. of farmers*
Paddy	300 (26)	220**
Cotton	380 (33)	140
Turmeric	190 (17)	189
Mirchi	140 (12)	80
Maize	70 (6)	35
Other crops#	63 (6)	50
Total area	1143	

* Each farmer may grow more than one crop in a particular season. This data is for Kharif season.

** The number is the actual number of farmers

include crops like groundnut and pulses like green gram, red gram, and beans

The cropping pattern, as given in Table 5.1, suggests that paddy is grown in 300 acres, accounting for 26 percent of area cultivated. Although cotton ranks high in terms of acreage, paddy ranks high in terms of number of farmers (220 farmers out of a total of 278 farmers in the village, i.e. nearly 79 percent of the total farmers). Paddy is the staple crop as rice forms major part of the diet. Except those farmers who don't have irrigated land all other farmers in the village cultivate paddy. The average acreage under paddy is 1.36. Some farmers cultivate paddy just to meet the annual food needs of the family while many cultivate it for market. Over the years because of undue emphasis on paddy by the successive state policies, and by the green revolution paradigm paddy has emerged as the most reliable crop. Apart from the assured market state also supports it by offering the minimum support price, which doesn't exist for many other crops.

Cotton, which can be grown under rainfed as well as irrigated conditions (semi-dry), has emerged as the important non-food commercial crop in Telangana. In the study village cotton is cultivated in 380 acres (33 percent of the total area under cultivation) by 140 farmers out of 278 in the village. The average cotton acreage is 2.71. Besides paddy and cotton, the most important crop in the economy of farmers of Nainala village is turmeric (*Curcuma longa*). It is cultivated in 190 acres by 189 farmers out of 278 (accounting for only 17 percent of total area under cultivation). The average area under turmeric is 1.05 acres. The other important crops of the village are mirchi cultivated by 80 farmers in 140 acres, with an average of 1.75 acres and maize (35 farmers in 70 acres). Other crops like groundnut and pulses (Green gram, red gram) are cultivating by 50 farmers in 63 (5.51) acres of land.

Rise of commercial agriculture

Akin to the changes widespread across the country the study village presents the rise of commercial agriculture. Farmers in the study village took to commercial cultivation in the late 1990s. Warangal district is one of the districts of Telangana where cotton and mirchi cultivation began on commercial scale in a big way. Cotton and mirchi are grown in black soils which have greater water retention capacity. The commercial cultivation of these two crops takes place in an enterprising manner in the district of coastal Andhra. However, in Telangana similar style of cultivation was not found until 1980s. During 1980s, when some entrepreneurial farmers from coastal Andhra leased in lands from the local farmers of the district and began cultivating cotton, other farmers got attracted to it. As the commercial cultivation of cotton yielded good results for these migrant farmers, local farmers began emulating them. Since then the cultivation patterns across the district have undergone tremendous changes. The success stories of the migrant farmers reaping good profits spread across the district attracting the attention of large and medium farmers.

Initially, commercial cultivation of cotton began with the large and medium farmers and later on spread to the small and marginal farmers as well.

The commercial cultivation of cotton underwent severe stress in the post liberalized period, which coincided with successive droughts, i.e. during 1993 to 2003. Unable to withstand crop losses on which farmers have invested heavily, many small and marginal farmers started committing suicides. The entry of Bt cotton may be considered as another watershed in the commercialization of agriculture in the district. What began with a small step Bt cotton cultivation spread like a wild fire and today the situation is that about 95 percent of cotton cultivating farmers use Bt varieties only.

Bt. cotton cultivation in the village led to drastic changes in the cropping pattern. Farmers find it profitable to cultivate cotton and other cash crops than food crops since the returns from these crops is high. Farmers had to learn the new ways of cultivating these cash crops on commercial lines. With the entry of commercial cultivation farmers' orientation to cultivation changed to profits and yields. Cereals, pulses and other crops which were grown earlier gave way to cotton and mirchi. *Oridholu Yakhaiah*, aged 40 years, a semi-medium farmer belonging to *yadava* caste and one of the progressive farmers in the village says that,

> *Bt cotton and mirchi crops were introduced by me in the village. It happened in late 1990s. Before that, there was no Bt cotton and mirchi crops in the village. When I visited one of my relatives in Khammam, I found him cultivating these crops. He reported that farmers in his village were getting good profits as the market was very good. This made me to think of introducing these crops in my field. With the help of my relative I started cultivating in my field. In the first two seasons, I faced several problems. Then I contacted the Agricultural Officer to get advices and solutions.*

Initially, I also made good profits. Looking at my experience other farmers in the village started cultivating these crops. Fortunately, the market also picked up in our district and the demand for these crops increased. One by one, other farmers in the village also started cultivating these crops.

Changing cultivation practices

With the rise of commercial cultivation and the introduction of new crops in the village farmers' perception, orientation and disposition towards cultivation changed significantly. This began in late 1990s and since then the worldview of farmers, their knowledge base and the cognitive frame with relation to crops, soils, fertilizers, and nature has substantially changed. An attempt has been made here to understand these changes by discussing the practices of cultivation in detail. Table 5.2. presents the list of practices taken up in the cultivation of crops in the village. The practices are generic in the sense that they are commonly performed for all the crops. Barring minor variations, depending on the crop, the practices followed are more or less similar for all the crops. The practices are listed and their adoption or non-adoption is mentioned under the four categories of farmers, namely, marginal, small, semi-medium and medium.

The reason for description of practices under different categories is based on the assumption that performance of practices varies with the economic category of farmers, i.e. land holding pattern. It is assumed that the disposition of small farmers towards certain practices is different from that of medium farmers. The variation also occurs due to their social, economic, cultural capital and infrastructural facilities and institutional facilities available to them. Access to information, credit, market, and knowledge assumed to influence the conduct of the cultivation practices. Table 5.2. presents the practices along the years of experience also. It is assumed that the levels of knowledge, disposition towards cultivation differ significantly based on the

years of experience. Thus, three categories are evolved, namely, young, middle, and senior. Young refers to those farmers who have less than 10 years of experience in cultivation. Middle level farmers are those who have years of cultivation from 11 to 30. The senior category includes those farmers who have more than 31 years of experience. Thus, the following description makes a detailed analysis of various practices along the different categories of farmers. Data on the practices of cultivation were collected from thirty respondents through in-depth interviews and observation during field operations. Thirty respondents were identified based on farming experience.

Table. No 5.2.Package of practices followed by farmers on the basis of landholding and farming experience

Sl.No	Name of the Practice	Number of respondents												Total (30)
		Marginal			Small			Semi-medium			Medium			
		Y	M	A	Y	M	A	Y	M	A	Y	M	A	
1	Field Preparation	1	2	3	1	3	3		1	2			1	17
2	Soil testing							1	1		1	1	1	5
3	Ploughing													
	Ploughing using country plough										1	1	2	18
	Ploughing using tractor	3	2		3	2	2	1	1	2	1	1	2	20
5	Seeds													30
	Seed testing			1		1	2		1	1		1	1	8
	Problems reported with seeds	1	2	1	1		1							6
6	Use of Farm Yard Manure		2	3	2	1	3		1	2	1	1	2	18
7	Use of Fertilizers													30
8	Usage of Pesticides													30
9	Mechanization and automation	3	4	1	5	2	3	1	1	2	1	1	2	26
10	Access to Credit													29
	Bank	1	1	1	1		1	1	1	2	1	1	2	13
	Money lender	2	5	1	4	2	1							15
	Relatives													01
11	Selling of Produce													
	At village	2	5	3	2	1	3							16
	At market	1	1		3	1		1	1	2	1	1	2	14
12	Agricultural Information Sources		25											
	Agricultural Officer								1	1	1	1	1	5
	Adharsha Rythu		1											1
	Progressive Farmer	1	2	3	1	1	3							11
	Fellow Farmer	1			2	1								4
	Mass Media	1						1	1				1	4
13	Non-Farm Occupations	3	2		4	1								10
14	Livestock		3	3	1	2	3	1	1	1	1	1	1	20
15	Sharing of knowledge and information	2	1		4	1		1	1		1	1		14

16	Customary practices based on beliefs and rituals	2	6	3	5	2	3	1		2		1	2	27
17	Traditional knowledge on weather			2	1	2	3		1	2				11

Practice No. 1: Preparation for cultivation

Field preparation is the first and foremost practice in crop cultivation. It involves removal of stubbles of old crop, clearing of plants and other unwanted material from the field, checking the pump sets, pipelines, erecting fences around the field, etc. Elder farmers shared that in their heydays of cultivation they used to start the process much earlier in the beginning of the monsoon season. They observed that preparation for cultivation used to begin immediately after *Ugadi* (Festival that marks the beginning of the New Year for Telugu speaking people). Before the onset of commercial agriculture and two to three crop cultivation a year, *Ugadi* used to mark the end of cultivation operations for the farmers in the village and also the beginning of new cultivation season. Wishing for a good monsoon and good harvest, farmers used to celebrate *Ugadi* with great devotion. It involved not just farmers, agricultural labourers and their family members but all livestock and farm equipment farmer has. A series of religious rituals used to be followed after *Ugadi* in appeasement of local deities through animal sacrifices, and cattle and carts parade around the temple or deity. These rituals used to be performed collectively by farmers and service castes, each one performing a particular role. Farmers used to contribute a large share towards the expenditure while the artisan castes used to provide their caste based services. Agricultural labourers used to provide manual services during the rituals which used to take place for three days to one week.

Ugadi is a festival that is celebrated appreciating the nature's gift to farmers. It does not involve animal sacrifices and meat consumption on this day. Brahmin plays an important role as he reads the *panchangam* (almanac for the coming year) which foretells the patterns of monsoon, rains, heat, diseases, natural calamities, etc. Apart from general features of the community, future prospects for individuals are also given in the *almanac*. Hence, listening to *Panchangam* is an important feature of farm families. It was suggested by elder farmers that farmers discuss the prospects in agriculture with the temple priest. It is important to note that *Panchangam* gives information, not just related to agriculture but it also provides information about the prospects for the individual in non-farm occupations as well. For farmers, however, this served as a source to make some estimation about rains, weather, diseases, markets related to agriculture, etc. Elder farmers suggested that, listening to *Panchangam* on the day of *Ugadi* is considered as auspicious. One of the elder farmers observed that *before the advent of news on weather, the only source of information about rains and other things related to agriculture was Panchangam. That is why every farm family subscribes to Panchangam. We used to place this in the prayer room in our house on Ugadi and after applying vermilion to the book we used to read it. Those who cannot read used to listen to the priest's verses from Panchangam. But now I don't find younger generation giving importance to it. Either they don't believe it or the present day cultivation has changed so much that Panchangam has no relevance as far as agriculture is concerned*.

Generally, *Ugadi* marks the end of the agricultural season of the year and it also marked the beginning of the new agricultural season. It is not that farmers take up activities directly related to cultivation immediately after *Ugadi*. But farmers used to plan for the next year's activities from this day onwards. In the words of *Jagiri Hanumanthu*, aged 63 years, belonging to the *gowda* community, the activities related to field preparation for the coming season include

We *used to have several works in the field after the harvest of the crop. Removing the stubbles of previous crop, repairing the irrigation channels in the field, taking care of the livestock, etc. were carried out during the period between the crop harvest and the onset on monsoons. We used to transfer farm yard manure from cattle sheds to the field using bullock carts. Later on farmers started using tractors. Now farm yard manure is not used the way we used to apply. It is because farmers don't have cattle. They only use poultry shed litter as manure.*

Another senior farmer *Akula Pedda Somanna*, aged 56 years, belonging to the yadava community said that, *I am using tractor for all the purposes because I don't want to delay the cultivation process. Country plough is the best option for ploughing, but it takes more time, energy and labour. I will get tractor for rent (hourly base) and I will finish ploughing within two days in my fields. After that I will start next practice in the cultivation process.*

Practice 2: Use of manure

Manure is anything that is added to the soil to increase its fertility to enhance plant growth (Boller and Hani, 2004). It is not just the urine and feces from livestock, but also the bedding, runoff, spilled feed, parlor wash, and anything else mixed with it. It is divided into two classes: Organic and Inorganic. Organic manures are derived from decaying material of plant or animal origin. Inorganic manures, also known as fertilizer, are derived from chemical processes. Inorganic manures usually provide only one of the many substances needed by plant for their growth (Boller and Hani, 2004). Cow-dung, leaves and all the waste-stuff piled up in the house are used for making 'natural manure' in the compost pits, which is used for cultivation. In the study village the amount of its usage in the cultivation process has been declining since last fifteen years.

Akula Ellaiah, 43 years of age, belonging to *yadava* caste owning 12 acres of land and having 22 years of cultivation experience observes that *I have 12 acres of land. I have been cultivating different kinds of crops in my field. I never neglected the use of manure in cultivation. I believe that it improves soil fertility. I have cattle and more than hundred sheep. This manure is used in my fields.*

It was observed that there has been a perceptible change in the attitude of farmers with relation to the use of farm yard manure. Young farmers rely heavily on chemical fertilizers rather than organic manure. Interaction with young farmers revealed that they are aware of the importance of organic manure in cultivation. But they feel that cattle rearing for manure is a labour intensive task. They also expressed the inability to purchase manure from others as there is a heavy demand for it. Moreover, those who have manure would rather prefer to use it in their fields than selling it to others. These views were found across different categories of land holders. Marginal and small farmers who also own cattle use the manure in their fields. However, the mode of transportation has changed as the majority of the farmers prefer using tractors than a bullock cart to transfer the farm yard manure to the field. They observe that with the use of tractor entire work can be completed in half-a-day or a day. With bullock cart the same work would have taken at least a week. Usage of tractor for transporting involves expenditure, as rent has to be paid for the tractor. But farmers express inability to use bullock cart. An elderly farmer observes that 'this generation of farmers thinks that work should be completed in a day or two. They don't have patience that we had. With our own pair of cattle and own cart the expenditure on transporting can be reduced. But they don't do that as they think it as a waste of time. Such kind of practices are in fact adding to the cost of cultivation'. When the same issue was discussed with young farmers, they replied saying 'using a bullock cart for transporting saves money. But there are not many carts available now in the village. Even hiring a bullock cart and labour for

transporting the manure is big a task for us. So avoiding the entire headache we prefer using a tractor than a bullock cart'.

According to *Perrumalla Chandra Mouli,* aged 56 years, a marginal farmer and toddy topper by profession belonging to *gowda* community, who has been cultivating 2 acres of land for more than thirty years, observes that,

we used to apply sufficient farm yard manure in the fields. Every farmer used to follow this practice. But since 15 years, the amount of manure applied has been declining. One of the reasons is that there is a decline in the livestock in the village. Present generation farmers have no patience to rear cattle. We used to live in joint families and there always used to be someone who used to take care of the cattle. Now husband and wife with children living separately, it is difficult to maintain cattle and take up agriculture as well. Hence, there is a shortage of organic manure to use. There is also a huge demand for it in the village. Farmers want to use organic manure, but due to lack of its availability they are using chemical fertilizers. That is why the fertility rate of the soil is decreasing day-by-day. Few farmers are using organic manure (sheep/ goat/ cow/ buffalo dung) for crops like turmeric and groundnut. But even this quantity has come down. Farmers use organic manure for turmeric cultivation because they think that it gives good yield. For other crops, farmers use chemical fertilizers.

Table No 5.3: Usage of organic manure

Farming category	Marginal	Small	Semi-Medium	Medium	Total
Young farmers		2		1	3
Middle level farmers	2	1	1	1	5
Senior farmers	3	3	2	2	10
Total	5	6	3	4	18

Table 5.3 presents data on the usage of organic manure by different categories of farmers. Data were collected from thirty respondents and only eighteen

farmers reported to be using organic manure. Those farmers who apply organic manure belong to different categories based on land holding, say, small, marginal, semi-medium and medium. However, what emerges from the data is that a majority of those who use organic manure are senior farmers. In other words, farmers with more than thirty years of cultivation experience are applying organic manure than young and middle level farmers. It was revealed during interaction with farmers that senior farmers recognize the importance of organic manure while the young farmers don't show great interest, although they know the importance of using the organic manure. Young farmers would rather go for chemical fertilizer than organic manure. One of the young farmers observes that 'it is easy to apply one bag (50 kg) of urea than applying one tractor load of farm yard manure'. Young farmers see the application of chemical fertiliser is more convenient that organic manure. They weigh the advantages between both, farm yard manure and chemical fertiliser, on the basis of time consumed, cost, labour involved and availability.

Time consumed for transporting and application of farm yard manure is more when compared to application of one bag of chemical fertiliser, which can be procured from the nearby town and applied by one person in no time. Cost of chemical fertiliser is apparently less when compared to farm yard manure. Also, due to the fact that state provides subsidy on chemical fertilisers the cost has been low. When enquired about the types of chemical fertilisers farmers use, majority of them reportedly use urea, and complex fertilisers. Awareness about chemical fertilisers, their composition and the specific benefits of each type are not very well known to farmers. But it has got into their technological frame that chemical fertiliser give good yields and convenient than organic manure. Ready availability of it also makes it as the preferred choice than organic manure.

Changing role of livestock in cultivation

Use of livestock in cultivation has been known since centuries. Domestication of cattle, sheep and other animals for various operations like ploughing, transporting, drawing irrigation water, etc. has been carried out by farmers since ages. Cattle and other livestock are also reared for milk and meat purposes. The litter has been the most important source of manure to the soil. However, cattle rearing and maintaining livestock demands a considerable amount of time on the part of the farmers. During the prevalence of joint families one of the family members used to be assigned the job of livestock and cattle exclusively. We also observe that at the village level farmers used to hire a person to take all the cattle of the farmers in the village for grazing. The community norms and conditions prevailed till the advent of green revolution led commercial agriculture. With the collapse of jajmani relations the system of hiring a person for cattle grazing has disappeared. As a result every farmer who owned cattle had to hire an extra hand to rear cattle or spare extra time of his own. With the onset of nuclear families the burden of cattle rearing has increased.

Perrumalla Narasaiah, aged 60 years, a marginal farmer, belonging to *gowda* caste observes that,

> *in the past ten to fifteen years the number of livestock in the village has decreased. Farmers, particularly the younger ones, are now unable to spend time and energy on cattle rearing. They prefer hiring a tractor for ploughing and chemical fertilizers than rearing cattle. It is also a fact that the small and marginal farmers don't have space near their houses to rear cattle. Moreover, the common grazing land has been shrinking year-by-year. What once used to be fallow land, now being converted into cultivable land. Earlier every farm family used to have more than five cows or buffalos. Only those*

farmers having more than two acres of land maintain cattle. They rear cattle for milk and manure. There are two milk centers in the village, namely, Gomatha pala kendram and Haritha pala kendram. Both these receive 90 liters of milk every day, which are transported to Thorrur town which is 15 km away from the village.

It may be said that the following factors influenced the decrease of cattle in the village.

- Sparing time and labour on rearing cattle has been viewed as a burden by the farmers and their family members. It was observed in the study that women in these families don't show much interest in rearing cattle. As women, who play a critical role in maintaining milch cattle don't show interest; men in the family are disinclined to rear cattle. While senior farmers and their family members appreciate rearing cattle for milk and manure, younger generation appears to be showing disinterest.

- It was reported that the usage of Bt cotton seed in the village led to many dead cattle (cotton leaves, at the end of the cotton season, i.e. after the last picking, are fed to cattle). Not really knowing the reasons, farmers have started showing disinterest in rearing cattle.

- Shrinking common grazing land and lack of availability of grass in the farmers' fields led to the decline of the cattle population. Cultivation of Bt cotton, mirchi, etc. led to the decreasing availability of farm by products which could be used as cattle feed.

- It was reported by farmers that the cost of cattle, feed and fodder has increased phenomenally over the past ten to fifteen years. The cost of a buffalo meant for milk is not less than Rs. 25,000/-. With the insufficient

veterinary medical care availability in the village and the vulnerability of hybrid buffaloes led to deaths due to diseases. As a result, some farmers who ventured into cattle rearing for milk production on commercial lines had to incur losses.

It was reported by farmers in the village that they are aware of the benefits of organic manure like farm yard manure. In fact, there is a heavy demand for it in the village. But lack of its availability is forcing them to go for chemical fertilizers. Small or marginal farmers neither can afford to maintain cattle, nor can buy farm yard manure. A young farmer respondent observed that *organic manure packets should be made available at the shops where we buy chemical fertilisers. If the government gives a subsidy on this the cost would come down drastically. This helps improving soil fertility significantly.*

Practice No 3: Soil testing

Soils in the study village are comprised of sandy loams with patches of shallow to medium and deep black cotton soils. One of the factors determining crop chosen for cultivation is the soil type. The knowledge about the suitability of a particular soil for specific crops is acquired over generations. This knowledge is available within the community and shared by the members. Farmers inherit knowledge from earlier generations who have developed it through experience and experimentation. Application of such knowledge becomes essential in commercial agriculture.

It was observed in the study that farmers have knowledge about the suitability of different types of soils for different crops. For decades, they have been cultivating crops which are suitable to the soil type. However, agricultural scientists insist that the soil properties should be assessed before planning for cultivation. They suggest that soil test would help farmers in knowing about the fertility status. Fertility status

of the soil can be improved by taking appropriate corrective measures. Although farmers are aware of the fact that over the years soil's fertility levels have declined drastically they seldom show interest in scientific testing. It was reported by the Agriculture Officer of the mandal that

> *before starting the cultivation process farmers have to test the soil for its fertility levels by taking the soil samples to laboratory located in the agricultural office at Nellikudur. However, very few farmers show interest. Particularly the illiterate farmers belonging to small and marginal categories don't show much interest in soil testing. They think it as a waste of time. Educated farmers show interest upon our insistence, but quite a few of them don't come to collect soil health card reports prepared by our department at free of cost.*

Data from the respondents also reveals that educational status and the size of land holding play an important role in soil testing. Out of 30 respondents only five respondents reported to have tested the soil fertility. Among them only three respondents reported to have collected the soil health cards from the Agricultural Officer. Among these five respondents, two are semi-medium land holders and three of them are medium farmers. No respondent from the marginal and small farming category has gone for soil testing.

Arupula Veeraiah, aged 32 years, is a semi-medium farmer belonging to *madiga* caste, and studied up to intermediate level cultivates multiple crops. He is also known in the village for starting the paddy cultivation for seed production. Seed production in paddy requires cultivation practices that are different from normal paddy cultivation. Seed production paddy involves planting of male and female lines in different rows. It involves intensive labour usage at the time of pollination. It is said that paddy seed cultivars deplete soil fertility as they consume lot of nutrients.

Hence, the companies which give these seeds insist upon the farmer to go for soil testing so as to replenish soil with deficient nutrients. However, *Arupula Veeraiah*, because of lack of knowledge, has never gone for soil testing. He thinks that he knows the soil fertility status better than what the scientific tests establish. He is aware that seed cultivars of paddy draw enormous soil nutrients and to compensate the loss he uses higher dosages of chemical fertilizers. Some of the young farmers with less experience reportedly incurred losses due to poor soil fertility. The young farmers went for seed cultivars of paddy as it fetches higher returns when compared to normal paddy. It was also observed that farmers pay greater attention to make more returns from crop than thinking about the soil quality or improving its fertility status. Among the younger generation, the assumption is that fertility status can be enhanced by applying chemical fertilizers. Except senior farmers (with more than 30 years of cultivation experience) not many farmers in the village discuss about green leaf manure (a particular plant variety) which is grown before the main crop, particularly paddy, and after attaining certain height is ploughed back into the soil and allowed to decay in the submerged field conditions. This has been the traditional practice which is advised by the agricultural scientists as well. However, the younger generation seems to pay little attention to the long term benefits of such practice and instead go for practices which provide instant results.

When inquired into the issue of not practicing green leaf manuring, it was reported by the farmers in general that today's commercial cultivation doesn't allow small and marginal farmers to take up such labour intensive and cost incurring practices. Although the long term benefits of the practices are there in the community's knowledge, the commercial cultivation exigencies deter farmers from adopting such practices. Any extra manual work or additional input which doesn't result in an instant and tangible result is found to be not adopted by the farmers, particularly the young farmers.

Those farmers who entered into agriculture recently (less than ten years) concentrate mainly on yields for which they use huge amounts of chemical fertilizers and pesticides, often more than required. Thus, the soil fertility status is affected. With high doses of chemical fertilizers soils become hard and as a result its water retention capacity decreases over a period. Now we don't find earthworms in most of the fields. Earlier, say twenty years back, earthworms used to be found in the fields. But because of the use of chemical fertilizers soil becomes hard and thus earthworms don't inhabit in these fields. Moreover the pesticide usage also killed these earthworms which are supposed to be farmers' friends. These were the observations of many senior farmers in the village.

Middle level farmers (who have 11 to 30 years of experience) have different understanding of the soil testing and its quality. Although they grow multiple crops and adopt commercial practices, they are more judicious in the use of chemical fertilizers. They have seen their fathers and elder farmers using organic manure and green leaf manure in abundance in their fields before the onset of green revolution led cropping practices and commercial agriculture in the region. They empathize with those who advocate the usage of organic fertilizers and adoption of green leaf manuring and also to the fact of declining number of earthworms in the fields. However, they also express inability to use organic manure and maintain good soil health because of the wider changes in the practices of agriculture which force them to fall in line. Over the last decade, they also got into the rigmarole of high yields, though high usage of chemical fertilizers.

Maiah Saiyulu, aged 42 years, a small farmer with 19 years of experience in agriculture belonging to *mala* caste (SC) cultivates crops like cotton, mirchi and paddy. He started commercial cultivation about a decade ago. But till last five years or so he used to apply enough farm yard manure. However, over the years the maintenance of cattle became difficult for him owing to family problems. As a result,

he sold the cattle and now has just two cows from which the manure produced is very less. As a result, he is forced to use more chemical fertilizers in his field. He realized that due to overdose of chemical fertilizer yields have not increased substantially after a certain point. Now, despite any amount of increase of chemical fertilizer the yields are just average. *Akula Isthari*, aged 56 years, medium farmer belonging to *yadava* caste with more than 35 years of experience is recognized in the village as a model farmer. He is known in the village for his hard work and venturesome attitude towards cultivation. It is said in the village that he tried different crops in his farm. He has four cows and seven buffaloes and even a flock of sheep. He uses this manure in all his fields and uses very less amount of chemical fertilizers and pesticides. This has reportedly improved the soil fertility status resulting in higher yields. Thota Narasaiah, aged 54 years, semi-medium farmer belonging to *mudhiraj* (OBC caste), having 32 years of experience believes in what *Akula Isthari* method of improving soil fertility. He follows the suggestions and thus made it a point to maintain his cattle despite several difficulties. He uses the manure in the fields.

It was observed in the study that while all the farmers know the importance of soil fertility status and the role of organic fertilizers and other traditional practices like growing green leaf manure crop, young farmers show reluctance in adopting these practices. On the other hand, senior farmers and middle level farmers consciously avoid over usage of chemical fertilizers and instead apply manure. These sets of farmers have reverence towards soil as mother earth and they believe that the way of respecting mother earth is by improving its health (fertility) by not over using chemical fertilizers. They believe that soil hosts many biological organisms (for example, earthworms) which will be killed with the use of chemical fertilizers.

Practice No. 4: Knowledge on weather

Agriculture, despite the rapid progress in crop sciences, still practiced with a great amount of dependency on the weather. Scientific explanations have led to the development of high yielding varieties, chemical fertilizers and pest control methods. Technological advancements have made tapping ground water from deep sub soil surface possible. Leading from the front the state pushed the agenda of high-input high-yield crop production paradigm under the name of green revolution in the country. The success of the strategy, however, is largely witnessed in command areas where irrigation water is abundant. Suitable soil, abundant irrigation water, timely support of the state in terms of input supplies and marketing enabled the farmers in the command areas to benefit immensely from modern cultivation practices. In a way this has turned agriculture into an enterprise.

However, the problem part of this episode is the spread of high-input high-yield notions of agriculture in non-command areas. Non-command areas are characterised by high dependence on rainfall, poor soil quality, and poor state support. The social, economic, educational and political background of the farmers in the non-command regions is very poor when compared to farmers in the command areas. Despite the limitations of social, economic and ecological, commercial agriculture entered into these areas rapidly. What used to be called as subsistence agriculture, characteristic of rainfed agriculture, changed to market oriented agriculture. Entry of commercial crops like cotton and mirchi into the region where the study village is located marked the beginning of vulnerability of farmers.

Farmers in the rainfed regions become vulnerable due to commercial agriculture not just because of lack of social and economic capital but because of inadequate understanding of crops they grow or irrelevance of traditional knowledge for the crops they grow. Those farmers who had vast experience in cultivation

escaped with less damage while the new entrants, emulating their counterparts in command areas, were brutally and sometimes fatally affected. This discussion places the importance of knowledge in cultivation and brings out the growing technology-knowledge gap in agriculture. It argues that with the traditional knowledge becoming irrelevant as the knowledge repository doesn't address new problems and in the absence of sufficient knowledge flow from authentic sources farmers evolve varied practices. It may be said that variations in the practices are influenced by sociological factors like caste, educational background, land holding, etc.

One of the important knowledge aspirations of farmers has been on weather. Farmer's interest on weather is related to cultivation practices. The traditional knowledge and sources help farmers making long term (annual) or short term (seasonal or still shorter periods) predictions. The key source of long term weather assessment is almanac, referred in Telugu as *Panchangam.* In olden days, it was reported by farmers in the study village that, farmers used to follow the predictions and plan the cultivation activity accordingly. In fact, predictions made in the *Panchangam* influenced their crop choice. If good rains were predicted, farmers prefer paddy and otherwise maize or sorghum or other rainfed cereal crops were grown. The extent of area under each crop used to be based on the predictions made in the *Panchangam.*

However, with the advent of commercial agriculture, farmers in the study village gives less importance to the predictions made in the *Panchangam.* They have a reverence for it and the auspicious days of cultivation, like sowing, harvesting, etc., are decided based on the auspicious days as prescribed in the *Panchangaam.* Further, young farmers show less interest in these when compared to senior farmers. Young farmers believe that these predictions are unscientific and they would rather emphasize the predictions made by the weather forecast released by the meteorologists. However, it was observed in the study that although young farmers

prefer scientific weather information, its availability has been inadequate. The same young farmers often complain that the information provided by the meteorology department is irrelevant or inappropriate to their region or crops. Sometimes they express the inability to understand the forecast as well. But they all agree that timely information gathering on weather during the crop season has become important because of commercial agriculture. As the investment on cultivation has gone high farmers were observed to be keeping their fingers crossed during the monsoon season. At one point praying for rains for starting cultivation operations like ploughing and sowing, and at another point praying for no rains as untimely rains would cause damage to the standing crop. The rains at the time harvesting have a devastating effect on yield and quality of the produce. There is a quotation in the village which says that r*ain is the saviour at the time of preparation of the field and breaker at the time of the harvest to the farmers*.

Senior farmers were observed to be having good knowledge in understanding weather and its movements. *Perrumalla Uppalaiah,* aged 54 years, belonging to *gowda* caste, having 37 years of experience in cultivation reported that his knowledge on weather is based on the appearance of clouds, night sky, wind speed, humidity, etc. On a particular day, during an interaction with him in the field, he observed at 1:00 PM that *today we will have rain in the village and we get rain from the southwest side of the village.* There was a heavy rain indeed at 5pm from the direction he predicted. It is not to suggest that the knowledge is always proved right, but the point to be noted is that such knowledge is available in the community for centuries. In fact, such knowledge helped farmers to continue in agriculture. Some farmers also observed that movement of birds, their sounds, movement of ants, etc. also help in making predictions.

Following are the few signs to understand the weather forecast by the senior farmers in the village:

1. Flying and moving of birds and ants
2. Sudden increase in temperature followed by humid weather
3. Hallo mark around the moon
4. Cloud formation in the North-East results in heavy rains
5. A cloudy night sky
6. They sense the arrival of the rain with the changing flavour of dust particles in the air, etc.

Farmers also observe certain religious practices invoking rains whenever there is a delay in rainfall. The temple priest performs special rituals to the local deity. Apart from this, the local goddesses like *Katta Maisamma* is worshipped with animal sacrifices for rains. Sometimes, it was told by the farmers that villagers organize a ritualistic procession of frogs tied to a stick and take it through the houses of farmers.

Practice 5: Irrigation

Green revolution paradigm emphasizes on irrigation as prescribed in the crop management practices evolved by the agricultural scientists for high yields. Usage of high yielding variety seeds, chemical fertilizers along with assured irrigation is the essential part of green revolution. Thus, it may be said that green revolution was introduced in the command areas where adequate irrigation is available. However, as green revolution spread to non-command areas farmers began tapping ground water for irrigation.

The study village, a non-command area, where cultivation depended on rainfall for centuries, has been witnessing substantial changes in the farmers' perspective towards irrigation. The village has a pond, spreading over more than 50 acres. It collects rain water which is used by farmers for cultivation and others in the village for various purposes which include its use for human needs as well as cattle needs. The village has an ayacut (area cultivated using water from the pond through its canals) of 300 acres. The canal from the pond serves the irrigation purpose to the fields under its ayacut. Otherwise, it also helps in recharging the bore wells and open wells. Farmers reported that they have adequate water availability through sources like village pond, open wells and tube wells in Kharif season. However, during Rabi there is always a shortage of water as water in the village pond recedes, open wells go dry and tube wells yield less quantity.

The major crops grown during Kharif are paddy, turmeric, cotton, etc. Particularly, paddy is grown where assured irrigation facilities are available. Either with the help of open wells or tube wells paddy fields are irrigated. Whenever the village pond receives sufficient water, farmers under the ayacut cultivate paddy. Otherwise, they grow rainfed crops. It was reported by the farmers in the village that there has been a steady increase in the area under paddy cultivation. Although many open wells have dried because of the indiscriminate digging of bore wells, the area under paddy has been increasing. With the bore well technology reaching the villages in the late 1980s farmers from upper castes and those who have large holdings went for bore wells. Seeing the benefits of paddy cultivation, over the years, many small and marginal farmers who own less than five acres began digging bore wells. This has resulted in the fast decline of the water table in the region, forcing farmers to go for deeper levels. Each bore well digging is a cost incurring exercise. Added to that is the cost of pipeline, pump set and electricity connection. Entire expenditure is borne by individual farmer as government doesn't provide any

subsidy. Banks offer loans for electric pump set and pipeline. Over the years, the number of bore wells in the village has gone high (350 number) and even the small and marginal farmers who have small holdings have gone for bore well digging.

What is important to mention here is that there has been an increasing crave for assured water among young farmers. Crave for water is because of the fact that paddy has emerged as the most remunerative crop. Because of state policies and concentration of agricultural scientists on paddy crop (in evolving high yielding varieties), availability of nitrogenous fertilizers, pesticides, and assured market, the farmers even in the non-command areas have started cultivating paddy. As paddy is an irrigation intensive crop, farmers have begun digging bore wells. In fact, it was said by some farmers in the study village that the farmer who has sufficient irrigation water has higher credit worthiness than those who don't.

Practice No. 6: Ploughing

Transition in various cultivation practices is evident in the form of increasing automation. Tractors have been fast replacing many farm operations in the study village. With the decline of the cattle population, farmers, including small and marginal, have been hiring tractors in farm operations. Particularly, ploughing for sowing has been done using tractors rather than country ploughs. There are 16 tractors in the village. Most of these are owned by semi-medium and medium farmers.

It is important to note that small and marginal farmers also have been hiring tractor for ploughing by incurring extra cost. The reasons for such a shift from animal power to mechanical power are sociologically important. One of the reasons is the declining cattle population. Another reason is that commercial cultivation demands quick operations. Young farmers believe that they cannot spend their time in ploughing the field using a country plough as it takes four to five times more than

what can be done with a tractor. A young farmer observes that *by hiring a tractor my field (two acres) can be ploughed within half-a-day. Otherwise with animal drawn country plough it takes at least two to three days. I cannot spare my valuable time in that as I can go for wage labour which provides me more money than what I pay for ploughing using cattle. It is the same attitude with all the farmers in the village. Particularly the young farmers do not have that patience.* It was observed that few senior farmers who are owner cultivators use animal drawn country plough for ploughing. Cattle drawn ploughs are mainly used for inter-cultivation in cotton and maize crops. Another important observation was that farmers use country plough for ploughing the turmeric field. When enquired farmers mentioned that, tractor being a heavy machine makes the soil harder. Others mentioned that, farmers' cultural notions that a country plough is auspicious to plough turmeric (again an auspicious crop for farmers) field influences the choice for country plough.

The entry of tractor in the cultivation made several changes in the agriculture. It reduced the work hours of the farmers and the time taken for ploughing. Total number of bullock carts with the farming households is less when compared to 15 years ago. Few small and semi-medium and medium farmers in the village are maintaining bullock carts for their agricultural purposes. No young farmer reported owning bullock cart. Senior farmers still depend upon the bullock cart ploughing and other purposes.

Practice No. 7: Seeds

Seed is the major input in the cultivation process. Green revolution gave much importance to the seed used in cultivation. The concept of high yielding variety seeds was introduced into Indian agriculture during the green revolution period. Since then agricultural universities and research stations have produced a number of new varieties in major corps in the country. The seed sector has been opened for

private players after liberalization. This has resulted in the availability of a number of varieties in all the major crops like, paddy, maize, cotton, mirchi, etc. All these claims to be high yielding varieties.

Traditionally, farmers in the village used to cultivate seeds obtained from the previous crop. Farmers used to select the best seeds from the previous crop for the next season. This was followed in all crops cultivated in the village. Paddy, maize, cotton, and mirchi were cultivated using the seeds available with the farmers or sourced from other farmers in the village or from outside the village. It was mentioned by one of the senior farmers that *'we used to come to know about the best performing seed type in the village through word of mouth or observation. Sometimes when we go to the town for other work, so in our casual conversation with farmers from other villages, we used to know about the best performing ones. Thus, we used to source the seeds from those farmers. We either used to pay in cash or used to offer other seeds in exchange'*. A marginal farmer mentioned that *'we always used to source the seeds from the large farmer of the village. Seeing the crop performance in his field we used to approach him for the seed'*.

However, after the introduction of commercial agriculture and with spread of the notion of 'high yields with new varieties' farmers in the village started purchasing seeds from the market. Now farmers believe that seeds from the earlier crop yield less when compared to the seeds purchased from the market. The dissemination of information about the use of fresh seeds for every sowing caught the imagination of the farmers. It was observed in the study village that each farmer spends a considerable amount of purchasing seeds. The cost of seed is high in the case of Bt cotton, maize, paddy, etc. What is important to note is that the seed material for turmeric, which is grown in a significant area, is sourced from fellow farmers in the village. Farmers also keep the required portion aside for the next crop

before selling it. Thus, we witness only in the case of turmeric crop farmers using the same seed material.

Except turmeric and groundnut, remaining crops like paddy, cotton, mirchi seeds are brought by farmers before starting the cultivation process. Nellikudur (4km), Thorrur (15), and Mahbubabad (35) are the nearest towns where farmers buy seeds, fertilizers and pesticides. Farmers in the study village also cultivate paddy for seed production under an agreement with the seed company. The company enters into an agreement with the farmers through an agent who is known to the farmers. In the case of cultivate the seed company provides the seeds. Other crop seed varieties are brought from the input dealer shops by the farmers on their own.

Factors influencing the choice of seeds

a). Government subsidy: Seeds are often made available to the farmers at subsidized prices, which are considerably lower than the non-subsidized seeds. Majority of the small and marginal farmers would go for these seeds as they cost less. Medium and semi-medium land holders purchase the best quality seeds irrespective of their cost. They give importance to the yield potential rather than the cost of the seed. Moreover, procuring subsidized seed involves waste of time as farmers have to wait for hours to buy the limited stock.

b). Years of experience in cultivation: Senior farmers were observed to be relying on their experience based knowledge in assessing the type of seed. They also have access to information from fellow farmers of the same village or from other villages. The social capital thus helps them selecting the best seed. They also appear to have an idea about the input dealer who sells good quality seeds. Medium and Semi-medium farmers also adopt the same strategy. The small and marginal farmers, however, rely on the progressive farmers in the village or the input dealer. It was

also observed that young farmers are greatly influenced by the input dealer in the selection of seeds.

c). Progressive farmers' choice: As mentioned above, small and marginal farmers often go by the word of the progressive farmer. They request the progressive farmer to get them the same seed variety that the former is going to buy. They think that the progressive farmer makes a good choice.

d). Input dealer: Since the opening up of agriculture sector the presence of an input dealer in the agricultural input market scenario has increased tremendously. In fact, they have emerged as the key source of information to the farmers. In the case of seeds, farmers, particularly the young ones, having less extent of land, rely on the suggestion of the input dealer. Sometimes the input dealers suggest those types on which they get a higher percentage of profit. Or they sell those types of seeds which are available with them. Although there has been a tremendous increase in the choice for farmers in the selection of seeds, often farmers fail to exercise their choice because of lack of availability in the market. The seed market has evolved into one of the high turnover businesses, which runs into billions of rupees. Thus, there is a great amount of competition among the seed companies in promoting their products.

f). Advertisement: It was reported by the farmers in the village that advertisement of seed companies in the electronic, print media and also in the form of posters, pamphlets has increased in the past one decade. The advertisement for cotton seeds is highest. Many companies, in fact, went to the extent of offering attractive discounts and free gifts on each purchase. It is not so contested in the case of paddy seeds. Thus, farmers were observed to be asking the input dealer for those company seeds which offered free gifts or incentives. It is important to mention that advertisements on electronic and print media have been propagating the idea of high yields through the seeds they promote. Some advertisements even carry the image

of Goddess Lakshmi with the seeds of their company. Seeds are thus equated with high yields and money flow. These advertisements catch the imagination of farmers using religious sentiments. It was observed that most the young farmers were reportedly influenced by the advertisements than the senior farmers.

It was also observed that farmers don't bother to check the authenticity of the seed. They just go by the word of the input dealer or the progressive farmer. They don't take receipt for the seed they purchase. On enquiry, the farmers suggested that the transaction is based on trust. However, it was also reported that in the case of a crop failure input dealer seldom takes responsibility. There are no instances of farmers getting compensation for crop's failure due to seed fault. It was reported by one of the small farmers that, whenever they approach the input dealer with a complaint or two about spurious seeds or fertilizers or pesticides the input dealer wouldn't take the blame. He always throws the blame on the farmer saying that farmers might have not adopted the recommended practice. It is important to note that the most of the small and marginal farmers cannot read. Even if they can read they seldom bother about reading the instructions in the overleaf or on the label (particularly in the case of pesticides) thinking that the recommended practice don't work in their farm situation. They simply follow the method as suggested by the progressive farmer of the village. Sometime the input dealer also explains his/her own version about the usage of the input, say pesticide or fertilizer. It was observed that farmers don't go for seed testing before sowing.

With relation to turmeric crop, as mentioned earlier in this part, farmers use the seed material available within the village. It was observed that farmers have sound knowledge about the preservation of turmeric seed. The senior farmers are well versed with the practice while the young farmers are learning from the former. The methods of preservation of turmeric seed material are traditional and the knowledge about which is acquired by trial and error and transferred from earlier

generations. But the saving of other crop seeds (like Paddy, Cotton, Mirchi and Maize) is not being practiced. As farmers started believing in the recommendations of the agricultural scientists and extension personnel who suggest for using fresh seed they have lost knowledge about the selection and storage of paddy or maize or groundnut seeds.

Preservation of turmeric seed material involves different steps. First, the seed material is graded and selected. The selected seed material is dried under shade and stored in a dry, cool place covering the heap with neem leaves. The seed material is preserved either at home or in the field. It was observed that the knowledge of preservation of turmeric seed material was learnt from earlier generations. It was also observed that no chemical is used in preserving the seed material.

Exchange of seed was a very common practice before the advent of high yielding seeds now available in the market. Farmers used to buy or borrow seeds from fellow farmers. Now this practice is discontinued in paddy and other crops. However, in case of turmeric farmers still follow the practice. Because of some reason (majority of the farmers in the village cultivate turmeric) if any farmer doesn't cultivate turmeric in one season s/he borrows or purchases from fellow farmer in the village.

Practice No. 8: Fertilizers

In present day's cultivation fertilizers are directly linked to high yields. The 'modern cultivation strategy' seeks to enhance food production not just by using high yielding seeds but also by using chemical fertilizers. Large doses of fertilizers have become imminent to realize the potential yields of HYV seeds. HYV seeds opened a new era in Indian agriculture, leading to a rapid increase in the usage of fertilizers. A mode of chemical agriculture accompanied the new hybrid seeds. The

HYV seeds have been developed so as to be highly responsive to ammonia fertilizer input (Dayal, 1984).

Fertilizer consumption in India rose from 1.0 kg. per hectare in 1956-57 to 7 kgs per hectare in 1966-67. Subsequently, it reached 46.4 kgs per hectare in 1984-85. The use of chemical fertilizers shifted from non-food crops to food crops. By 1976-77 about 80 percent of the total fertilizer consumption was on food crops, mainly because of a rise in the share of wheat from 3 percent in 1955-56 to 22 percent in 1976-77 (Roy, 1990).

Table No: 5.4: Usage of chemical fertilizers in India

Consumption of Fertilizers (lakh tonnes)	1991-92	2000-01	2005-06	2009-10	2010-11	2011-12
Urea	140.04	191.86	222.97	266.73	281.12	295.65
DAP	45.18	58.84	67.64	104.92	108.70	101.91
MOP	17.01	18.29	27.32	46.34	39.32	30.29
NPK complex	32.21	47.80	66.94	80.25	97.64	103.95
SSP	31.65	28.60	27.56	26.31	38.25	47.46

Source*: Government of India 2013.*

Table 5.4 presents that the application of urea has increased from 140.4 lakh tones in 1991-92 to 295.65 lakh tonnes in 2011-12. Consumption of DAP, MOP, NPK complex and SSP have also increased significantly over a decade. Consumption of nitrogenous (N), phosphate (P), and potassium (K) fertilizers have increased from 1.1 million tons in 1966-67, the year preceding the green revolution to 27.7 million tons in 2011-12. The all-India average consumption of fertilizers has increased from 105.5 kg per ha in 2005-06 to 144 kg per ha in 2011-12. (Government of India, 2013).

It was observed in the study that farmers have become aware of the importance of chemical fertilizers for augmenting yields. In crops like, paddy, cotton, etc. farmers believe that sufficient doses of nitrogenous fertilizers would improve yields. The shift from the organic manure application to chemical fertilizers has been gradual. Over the years, the application of organic manure has been declining and chemical fertilizers has been increasing. As discussed in the earlier part of this chapter, declining cattle population is leading to increased reliance on chemical fertilizers.

Application of fertilizers takes place at two to three stages during the crop production. In case of paddy, use of chemical fertilizers begins with nursery raising. Then the basal dose is applied during transplanting, and at the time of second weeding. In cotton production, fertilizers are applied at two-three stages during the crop growth. It was observed in the study that there has been a significant difference in the way farmers apply fertilizers from the recommended practice.

Not just the difference in the recommended dosages, but there are variations in the application process itself. It is a common practice among farmers to use a higher dosage than the recommended one. As farmers feel that high fertilizer usage would result in high yields, the usage of fertilizers in all the crops is higher than the recommended dosage. When enquired, farmers suggested that *'we believe that yield is directly linked with fertilizer usage. There are stories in the village about farmers producing bumper crops using high fertilizer dosage'*. However, it is important to note that the yield may not be the direct result of high dose of fertilizer usage. It also depends on the seed variety and soil conditions. But what enters into the technological frame of the farmers is that high fertilizer usage leads to higher yields.

The senior farmers were observed to be cautious in using fertilizers than the young ones. Young farmers find it convenient to use chemical fertilizer than using

manure. They reported that it is always easy to apply fertilizer than applying manure. It is not only convenient to apply, but also easy to procure as it is available in the required quantities in the market. When asked about the cost of chemical fertilisers to organic manure, they said that '*the cost is more. But preparation of manure requires year long engagement. In the absence of cattle, procurement of manure has become difficult. Thus, we (young farmers) prefer using fertilizers than manure*'.

What is interesting to note is that all the respondents are aware of the negative consequences of chemical fertilisers. They all report that high usage of fertilizers leads to hardening of soil top layer, kills soil microorganisms which are useful for plant growth. They also reported that food grains produced using chemical fertilisers doesn't give required energy to human body. A senior farmers reports that *'what we eat today (referring to rice) is a waste as it contains just chemicals. After eating, within an hour we feel hungry. Earlier days the local varieties of paddy cultivated using manure were so good that one good meal would have been sufficient for a day. These food grains are not only less nutritious but also weaken our body'*. One of the respondents by name, *Sivangula Mallaih*, aged 30 years, a marginal farmer having less than ten years of experience in cultivation belonging to *yadava* caste observes that soil condition has been declining after using high doses of fertilizers. Without adding of manure and complete reliance on chemical fertilisers soil is becoming weak. He said that he used high amount of fertilizers for the last five years onwards and now he is experiencing the results of what he has done.

Table No 5.5: Usage of Chemical Fertilizers

Farmer category	Less than the recommended dose	Recommended dose	More than the recommended dose	Total
Young		2	8	10
Middle level	1	6	3	10
Senior	6	3	1	10
Total	7	11	12	30

Table 5.5 presents that 12 respondents use more than the recommended dose of fertilizers. Out of these 12, eight are young farmers. It may also be observed from Table 5.5 that senior farmers use less than the required doses. They appear to be aware of the ill effects of the chemical fertilizer. They said that not only human body, but also soil becomes weak because of high usage of chemical fertilisers. The senior farmers apply manure in sufficient doses and thus are able to reduce the application of fertilizers without actually affecting the yield. However, young farmers rely on chemical fertilizers only.

It is important to mention that farmers use chemical fertilizers according to the crop cultivated. It was observed that there is a high usage of chemical fertilizers on cotton crop when compared to paddy. The lowest fertilizer consumption was observed in the case of turmeric crop. Farmers believe that fertilizer application beyond a certain limit would affect the quality of the turmeric. They also know that soil becomes hard with high doses of chemical fertilizers which is not conducive for turmeric growth. The other important observation is that farmers are aware of the relationship between chemical fertilizer usage and occurrence of pests. They say that nitrogenous fertilizers enhance crop growth significantly so much so that pests develop within no time to feed on the luxurious growth. In order to control pests they have to go for additional sprayings of pesticide. They suggest that *it is a kind of a treadmill. To increase yields we have to apply more and more chemical fertilizers. The application of chemical fertilisers result high incidence of pests. To*

control pests we have to spray pesticides. It is a chain like process. That's why the cost of production is increasing year by year. We cannot stop using fertilisers because low yields would not be sufficient to meet the expenditure on cultivation and also our family commitments. These are not the days when farmers used to eat what they produced. But, today we produce for market from where we get little to support our family's health, educational and other needs.

Practice No. 9: Pesticides

Commercial agriculture demands diligent crop management to reap yields as suggested by the agricultural scientists. The best management practices of crop production necessarily make a mention of pest and disease control. Use of nitrogenous fertilizers and mono cropping were perceived to have increased the pest and disease incidence in the study village. Farmers observed that with the emphasis on high yields, farmers use more nitrogenous fertilizers which results in luxurious vegetative growth. This attracts the pests which feed on plant leaves, and bolls or pods (in case of cotton and pulses). The incidence of pests and diseases coincides with weather also. Longer cloudy spells during Kharif season triggers the incidence of pests and diseases.

Farmers report that new kinds of pests and diseases have been witnessed with the advent of commercial cultivation. Crops like paddy, cotton, etc. which are grown using high dose of nitrogenous fertilizers attract a variety of pests. Knowledge about the features of pests is observed to be limited among farmers. Farmers feel that the traditional methods of pest control are not effective. Traditional knowledge on controlling pests on standing crop is inadequate as farmers are witnessing new pests. For example on paddy not many pests and diseases were affecting when cultivated using less chemical fertilizers and more manure. A senior farmer reports that *some pests used and affect the plant when it is young. But it used to be controlled over a*

period due to weather factors. Sometimes we used to drain the whole paddy field for a day or two control the stem borer. However, as the area under paddy cultivation has been increasing since last decade and farmers began using more and more fertilizers we are witnessing new pests and diseases. A disease like smut which was never seen in the village is affecting paddy.

It was reported by farmers that cotton is the crop which attracts more number of pests. As farmers spend a considerable amount on its cultivation, seeking profits through high yields, use pesticides from the first fortnight of sowing. One of the middle level farmers mentioned that '*about six to seven years back, from one month of sowing the cotton seeds we used to be in the field with a sprayer. We used to witness a number of pests damaging the leaves. At later stages boll worm used to cause damage to the cotton boll. Once affected, the yield goes down drastically. It was very difficult to control that pest. Farmers used to run to the input dealer and purchase whatever he offered. Farmers also went by the advertisement in the newspapers and on television by the companies selling pesticides to control boll worm. It was a difficult phase. Many farmers used to try out their combinations of pesticides to control the pest. After the introduction of Bt cotton we are to some extent saved from spraying the pesticide'*.

Similarly the pests and disease attack on paddy and groundnut also increased. The knowledge about which is observed to be limited. In the absence of community knowledge farmers rely on the immediately available source. The immediate source for farmers that emerged very quickly is the input dealer. The progressive farmers, with their networks and social capital could access the Agricultural Officer while the small and marginal farmers relied either on the input dealer or the progressive farmer of the village. In the absence of state led extension services, farmers' reliance on input dealers became inevitable leading to harmful effects on cultivation. Inappropriate, unverified suggestions by the input dealers often led to ineffective

control of pest or disease. This has necessitated further spraying resulting increase in the cost of cultivation.

Pesticide usage is high among farmers across different types of land holdings. There is no difference between the marginal farmers to medium farmers as far as the usage of pesticides is concerned. Only few senior farmers belonging to medium and semi-medium categories use the recommended dose of pesticides.

It was observed that farmers' knowledge about diseases and deficiencies is less when compared to pests. In the cases of disease damage, farmers take the leaf or the entire plant to the input dealer to get a solution. *Arupula Srinivas,* aged 32 years, a semi-medium farmer from *madiga* caste, having seven years of experience in cultivation observes,

"I have been using a high dose of chemical fertilizers and pesticides from the beginning to achieve high yields. Although the use of high doses of fertilizers and pesticides resulted in good yields for the first three to four years, later on there has been a considerable decline. Even though I am not decreasing the dose of fertilizer and pesticide the yields are coming down year by year. It happened not only with me, but other farmers of my age in the village are facing the same problem".

This showcases how the younger generation of farmers got into the fertilizer-pesticide treadmill. High cost of these inputs has increased the cost of cultivation significantly. As the cost of cultivation is increasing, farmers become desperate to increase yields. Hence, they end up using more pesticides and fertilizers. In case of crop failure, due to bad weather like unseasonal rains, or drought spells at critical periods resulting in crop loss, the amount invested on crop goes waste and farmers end up in debts. Unable to bear the debts some farmers commit suicides. Although no farmer in the village committed suicide, but such incidents were reported in the

adjoining villages. For that matter Warangal district, where the study village is located, witnessed highest number of farmer's suicides in the past one decade.

The reasons for no farmer suicides in the village were probed by the researcher. It was assumed that as majority of the farmers cultivate cotton, the general bad weather conditions would have affected the yields of cotton and other corps in the village also. But it was reported by farmers that turmeric crop has been saving them in the event of crop failure. Turmeric crop is cultivated using traditional practices and with less dose of chemical fertilizer and no pesticide application. Turmeric has been giving them consistent yields even when other crops fail. Hence, farmers of every category cultivate turmeric in a limited area. The seed material used in turmeric is locally grown and farmers use relatively high amount of farm yard manure in turmeric crop. Usage of pesticides was found to be absent. Even few farmers are also unhappy about the usage of pesticides. One of the respondents by name, *Vasireddy Yadhagiri Reddy,* aged 45 years, a medium farmers belonging *reddy* caste observes that,

"for the last twenty years onwards I have been using fertilizers and pesticides in my fields to get maximum yields, but now I am unable to spend so much. Because of increased cost of fertilizers and pesticides I have reduced their usage. I have also noticed that soil quality and fertility is going down. I have also observed increased susceptibility of crops to pests and diseases. After knowing about the pesticidal properties of neem I have started using it in different forms. Neem cake application and neem spray are the practices I have learnt. I have also started using organic manure in high amounts".

Some farmers have turned their attention to organic fertilisers and pesticides in the last five years. This knowledge is developed by farmers because of the dissemination of information by an NGO. *Pragathi Seva Samithi* (PSS), an NGO

has been propagating the idea of organic fertilisers and pest control methods. They promote the use of *neem* leaves and cow urine for controlling pests. Farmers were taught about the preparation of the solutions suing cow urine and neem leaves. The training was given in the year 2009-2010. For some years, farmers followed the suggested practices. But after some years they have stopped using them. Except few farmers, others have stopped practicing. *Oridholu Yakhaiah* is a semi-medium farmer in the village who practiced organic pesticides observes that,

"with the help of Pragathi Seva Samithi (PSS) extension functionaries I have learnt preparing organic pesticides and I have also applied them in the field. I found them very helpful. But now I have stopped preparing them and using them. This is because I find it time consuming. As I have to take care of the field I feel it is quite easy to get a pesticide from the market and spray instead of preparing the solutions using cow urine and neem".

Practice No. 10: Marketing

Marketing the agricultural produce is an affair that involves farmers' interface with the forces that are entrenched. These forces operate market in such a way that the farmer is always at a loss. If it was the traditional *shahukar* who used to buy the agricultural produce within the village in the earlier days, now emerged the class of market agents and their middlemen. Farmers can sell their produce either in the village or at the market yards located in the nearby towns. Over the years Warangal town emerged as an important trade centre for cotton. Cotton growing farmers take the produce to the market yard located in Warangal. This is an institutional mechanism where fair price and fair weighing is promised. However, there are non-institutional mechanisms which buy the produce at farmers' fields operating on trust. Kesasamudram market emerged as the important place for marketing the produce for the farmers of the village. As it is located close to the

village and the availability of traders for all crops except chilli, farmers prefer to sell the products here instead of taking it to Warangal.

Those farmers who have borrowed loans from the money lender often sell the produce to him. The important shift in the marketing of the products is that farmers' preference for selling the products at the market yard or in the nearest town. There has been an increased awareness on the price trends for the product and farmers started keeping a close watch as they have entered into commercial agriculture. Selling to the middlemen or money lender within the village was observed to have been reduced as every farmer wishes to make little more profit. Unless they are in debt to the money lender, farmers prefer to sell the produce to the trader.

It was observed that turmeric has a traditional market mechanism with which all the farmers are well versed. The new markets that emerged in the last one to two decades are cotton, chilli, groundnut, etc. Paddy also has the traditional market, which is sold within the village. There were perceptible differences in marketing the produce along experience and landholding. Senior farmers, with their experience acquired over the years, were observed to be cautious in selling the produce while the young farmers were venturesome. Young farmers reportedly explore various avenues to sell the produce. They keep a close watch on the market movements and evaluate the different options. Those who offer the highest price, who absorbs the cost of transportation and labour are preferred by the young and middle level farmers. Caste doesn't seem to play any role in marketing the produce. However, medium and semi-medium farmers were observed to be market savvy while the small and marginal farmers go by the oral commitments made by the trader at the time of selling the produce. Farmers sell paddy, cotton and maize at the Kesasamudram market and chili and turmeric at the Warangal market yard. The

majority of the young farmers (90 percent) among the respondents sell the produce in the market yard, whereas only 45 percent of senior farmers sell at the market yard.

Changing cultivation traditions

Agriculture has been a way of life for people engaged in crop cultivation. The social structure, political framework, cultural traditions, religious rituals, economic status, etc. have been influenced by agriculture for centuries. India, predominantly an agrarian society, had been influenced by agriculture immensely. If religion provided the world view, agriculture provided the material view, thus influencing the individual disposition towards nature, society, community and individual. Agricultural practices and individual's world view have been mutually influencing each other. The world view about nature, its production capabilities, plant, water, soil, well-being and living have been influencing the cultivation practices. Similarly, approaches to cultivation, interventions in agriculture – technological, social, economical and political – have in turn been influencing the nature of cultivation.

It may be observed that till the advent of green revolution agriculture progressed slowly, in tandem with nature and the social structure. The social structure that evolved through agrarian relations placed limitations on agriculture, apart from nature itself. However, green revolution impacted so much that it heralded the beginning of a new tradition. The material outlook of farmers changed from the point of nature and its impositions to the point of opportunities and manipulations. Thus, a new tradition of cultivation marked by human interventions on soil, plant and water evolved. What used to be subsistence farming turned into farming that provides unbounded opportunities. To substantiate further, outlook of farmers towards seed, soil, water, insect pests and diseases, etc. changed radically with the introduction of green revolution.

The next turn of change in the cultivation tradition came with the commercial agriculture. The springboard of green revolution offered unbounded opportunities in crop production. The possibility of economic emancipation through intensive input usage, high investment, agriculture with a unified motto of high yield has been guiding the new cultivation tradition. The notion of high-yields through intensive input usage has been influencing the cultivation practices of farmers of today's commercial agriculture. Modern scientific knowledge which privileged productivity and high yield is seen as a means of making more money. However, the recommended practices (referred to as best management practices, BMPs) are seen as ideal practices by the farmers in the village. However, it was observed that they have evolved their own versions of the BMPs. The adapted BMPs are not verified scientifically, but have the approval of a community of farmers. The thing that certain practices are observed commonly by a large number of farmers in the village suggests the acceptance of the community. Hence, there is always a variation in the adapted practices and recommended practices. However, what is interesting to note is that the variation is high at the marginal and small farmers' context and young and middle level farmers' context. Marginal and small farmers observed to have received altered form of knowledge as their dependence on progressive farmers and traders is high. The knowledge (about various practices related to cultivation) is transmitted orally through the word of mouth and observation. The adoption of the practices is influenced by the factors related to the individual farmer. Socio-economic status, educational status, land holding, availability of family labour, etc. seem to influence the degree and extent of adoption. Thus, the researcher witnessed greater variation in the practices between different categories of farmers.

These variations are more apparent in the usage of chemical fertilizers, pesticides, machinery, seeds, and marketing. It was observed that while senior farmers make a judicious adoption of practices the young farmers appear to be

resorting to extreme forms of adoption, for example, use of chemical fertilizers. The senior farmers are aware of the fact that chemical fertilizers are to be used to the extent that soil quality is not affected and they have to be supplemented with organic manure. The young farmers view chemical fertilizer as a means to enrich soil fertility that is needed for high yield. The importance of manure is not thought about as it doesn't provide immediate or instant results.

The new tradition of cultivation that is found in the village is based on time, efficiency, market, etc. Farmers would like to complete the cultivation operations quickly. Even though it costs little more farmers (young and middle farmers) would like to complete the operation in a day or two. For example, ploughing, paddy harvesting, inter-cultivation, etc. A senior farmer observes that, earlier paddy harvesting used to take place at least for a week. The paddy harvesting operations involve cutting the standing paddy crop, preparing bundles, transporting them to the threshing site, threshing, winnowing, making straw bundles, and transferring the grains to the farmers' house or market. All these were done manually and thus used to take about a week's time to complete all the operations for one acre of paddy field. But now-a-days with the entry of paddy harvesters (machines) one acre of paddy harvesting can be done within two hours and farmer will see the grains ready to be sold. In those days (olden days), agricultural labour was available and these operations used to provide them employment for a considerable period. Now there is a difficulty in getting the agricultural labour. That's why farmers, small, marginal and others, wish to go for machine harvesting. It is also important to note that because farmers are cultivating in a commercial mode, i.e. high input for high yields, they don't want to take any chance with rains. Sometimes untimely rains affect the paddy harvesting. Because of the anxiety farmers would not like to spend a week's time for the operations. Although it costs double the rate farmers still prefer machine harvesting. So there is a change in the levels of understanding and the rationality

they use. Although with machine harvesting farmers will not get any straw, which is being used as cattle feed, farmers in the village prefer machine harvesting. This example of paddy suggests at the changing tradition. It offers a logic which places market in the centre. If the earlier tradition, i.e. manual operations located human welfare (wage days for agricultural labour), livestock (cattle feed), environment (paddy by product used as cattle feed instead of burning, which is done with the machine harvesting), ecology (cyclical – availability of feed – cattle rearing – manure – soil fertility – less dependence on chemical fertilizers). This tendency, of using machines for quick completion of tasks, is seen in all the crops. For example, use of tractor for ploughing, use of power sprayers for spraying, use of weedicides (used in paddy crop after transplantation to control weed growth for at least one month) in paddy, and maize, use of maize and groundnut decorticator replacing human labour, etc. Efficiency is evaluated in terms of yield and time taken. High yield and quick completion of the task are the guiding principles. Availability of various inputs like, seeds, fertilizers, pesticides and the services on hire like tractors, harvesters, etc. have increased over the years, making farmers' dependence on external sources near total.

Changing nature of work

Farming is the primary activity for the rural people in the country. About 52 percent of the total workforce is still employed in the agricultural sector, which makes more than half of the Indian population dependant on agriculture for sustenance (NSS 66th Round). Nevertheless, within the rural economy, the percentage of income from non- farm activities has also increased. In other words, engagement of rural population in non-farm occupations has been increasing. It is important to note that although the area under cultivation is increasing the amount of time people spend in non-farm occupations are increasing. This was witnessed in Nainala village.

It was suggested by farmers that earlier they used to spend more time in the field. They used to start the day at 6 in the morning attending cattle which were located in the field and irrigating the field. They used to come for lunch around eleven and rush back to the field where they used to spend time till six in the evening. But, it was observed in the study that, farmers, including the small and marginal would not like to spend more time in the farm. Although they cultivate on their own using family labour, they neither prefer to spend the whole day in the farm nor for a long time during the crop season. It must be mentioned here that farmers, including the small and marginal, have turned to commercial cultivation. Despite this, farmers prefer to spend less time in the field. The reasons were ascertained from the respondent farmers. It was told that a majority of the farmers – small, marginal, and even semi-medium- would like to take up other income generating activities, either in agriculture or in non-agricultural based, to earn little extra money to support their family. After the launching of Mahatma Gandhi National Rural Employment Guarantee Programme (MNREGA) farmers find it convenient to take up such employment in the pre-lunch time and perform agricultural activities in their fields in the latter part of the day. In fact, farmers suggest that entry of MNREGA changed the whole notion of work and employment in the village and even in the region. The other important reason for spending less time in the field is mechanization. As machines for different activities have entered the village all types of farmers prefer engaging them to complete the task early and take up instant income generating activities which will support the family till the crop is harvested. Offering their labour for daily wages is also linked to the changing economic and agricultural situation in the village. As discussed, farmers have taken up commercial agriculture in a big way necessitating huge investment by their economic standards. To meet the investment needs farmers offer their labour to earn cash. The other reason is that farmers are well aware of the risks associated with commercial agriculture. As any crop loss would throw them into debts farmers prefer to save some money earned

through wage labour. It was also observed that because of increased transportation facility between their village and the nearest town farmers go for wage labour work in the town. Most of them are engaged in house construction work.

Due to the increased opportunities for wage labour, marginal and small farmers take up such work instead of spending time in their farm. To compensate their absence, they are encouraging their wives to take care of the farm. It is a common phenomena among the small and marginal farmers, especially from the Dalit and few backward classes in the village. The study found that young farmers from these communities are practicing this method. At the time of important practices in the cultivation, men visit the fields. Other farming categories like semi-medium and medium farmers spend more time in the fields when compared to small and marginal farmers. Interestingly, senior farmers keep themselves in constant touch with the fields. Senior farmers prefer to spend time in their fields as they have great reverence for the farm.

The implementation of Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) 2005 led to drastic changes in the agricultural scenario in the countryside of India. Even though it is a welfare policy for the rural people and it affected agricultural activities at the larger level. By making employment available to the eligible persons in the village for not less than hundred days the MNREGA created a contradiction in the village. As the employment days coincide with farm activities like sowing or harvesting, farmers in the village find it difficult to find wage labourers. Farmers suggest that they have to pay more wages to attract labourers for farm work. In the absence of sufficient labourers farmers also started relying on machines like tractors, harvesters, etc. The cumulative effect was the increase in the cost of cultivation. A 63 year old farmer having 15 acres of land with 36 years of experience, by name *Vasireddy Lakshmana Reddy* observes that,

today cultivation has become expensive. The implementation of MNREGA in the village made severe changes in agriculture. Due to this farmers are unable to find agricultural labour. Even if they are available, we have to pay more wages. Earlier, labour cost was less and also the availability was sufficient. But after the implementation of MNREGA farmers don't find labour and have to give more wages for the same work. Ten years back men were paid Rs. 50/, per day per person while women were paid Rs.30/-. Now we don't find men and women labourer even if we pay Rs. 200/- and 150/- respectively. In fact, because of the programme of the government, work culture in the village has been damaged. This is because under MNREGA people work just for three hours and that too in silly jobs without having to do any physically laborious works. They go at 8 in the morning and come back by 12 in the afternoon for which the whole day's wages are paid. There is no proper supervision over these works. This programme became a political one as the ruling party thinks that it will fetch votes. What is the use of creating a workforce which is not oriented to local needs? This is changing the work culture in the village.

Another respondent by name *Jagiri Yakhasaiyulu,* 52 years of age, and a semi-medium farmer belonging to *yadava* caste observes that,

the programme is beneficial for the agricultural labour families. But it should be implemented during slack seasons of agriculture like, after harvesting the Rabi crop (April or May) or whenever there is a drought situation. Otherwise, it is creating lot of problems for the farmers. Another way is to include agricultural works under MNREGA works. This will in fact benefit both the parties.

Changing relations of work

Agricultural labour, unlike other forms of labour (like industrial wage labour or labour in non-farm occupations), is characterized by historical bondage with farmers. The earlier form of association with farmers, particularly large farmers was exploitative and unfree. The unfree labour is an important characteristic of feudal relations. Unfree labour helped the landed class to realize surplus. Indian agrarian relations were characterized by jajmani relations which provided hereditary, family based, caste based relationship between land owning families and the artisan castes in the village. Of course, agricultural labour was drawn from outside the artisan/service castes. Emergence of the cash economy and commercial agriculture resulted in significant changes in the labour relations in rural India.

It was observed in the study village that the availability of agricultural labour has been shrinking year by year. Many senior farmers have complained about the present situation of agricultural labour while young farmers are coming to terms with it through mechanization. Senior farmers from medium and semi-medium category observe that the present generation of agricultural labour is not skilled in agricultural operations. *Chatla Sathaiah*, One of the senior farmers' complain that the *'present youth has no stamina that we used to have at that age. Young agricultural labour cannot handle laborious works for a long time during the day. That is why they prefer mechanization. I think that they have no stamina. Because what they eat is chemical based food. We used to consume all types of cereals produced without using chemicals. Hence we have greater endurance and resistance than them*.

On the other hand the young men and women from the traditionally agricultural labour class feel that it is not worth spending the whole day in the hot sun (or rain or cold) in the farm doing agricultural operations. Given a chance they prefer taking up non-farm based works. It was observed that many landless labourers

and even some of the small and marginal farmers going to work outside the village, in the nearby towns, by autos for daily wages. The wages are more when compared to agricultural works. And also the payments are immediate when compared to farm labour. Increasing opportunities for work outside the village is one of the reasons for the shift from the agricultural work. Also the increased transportation facilities enabled greater mobility from the village.

The patron-client relations have disappeared as farmers entered into commercial agriculture. Agricultural labourers are free to choose the work they like. The relationship between farmer and agricultural labourer doesn't spill over to other aspects of social life. It is monetary and immediate. There is no long term mandatory association between them. Moreover caste ceased to be a determinant. The relationship is based on trust. It is the trust that the agricultural labourer has towards the farmer for quick and fair payment of wages and farmer about the skill and sincere work of the agricultural labourer. The study did not find any agricultural labour associations in the village. Although the village is influenced by the Communist ideology, there is no organization working for the agricultural labourers, neither the study finds any feudalistic relations between farmers and agricultural labourers. It may be said that a majority of the farmers are owner-cultivators. Farmers and their family members, including women participate if farm operations. Hence the disparity between the agricultural labourer and farmers is not high. As many of the erstwhile agricultural labourer families acquired land the gap between farmer and agricultural labourer was not found. Moreover, the feudalistic tendencies in agrarian relations disappeared with the withdrawal of upper caste (*Reddy*) from agriculture. As they moved out of the village to Hyderabad or to the nearby towns there is no large farmer in the village. Thus, the village doesn't have the exploitative agrarian relations. Rather, it may be said that market has emerged as the exploitative force in the present context.

Coexistence of multiple knowledge systems

The discussion so far highlighted the trends in practices of cultivation. The ensuing part of the chapter presents an analysis of the changes and continuity in cultivation considering the emerging and prevailing notions on agriculture by farmers which contribute to the knowledge system in the village.

Changes in cultivation practices are galore. It is found across castes, land holdings and crops. The way agriculture is practiced and disposition to agriculture, however, is different across age groups. Senior and middle farmers continue to appreciate and apply the knowledge they learnt from their parents and other farmers in the village while young farmers rely on knowledge they acquire from sources external to the village. For example, input dealer has emerged as the most important source of information among farmers.

Farmers' disposition towards certain key practices in agriculture is undergoing change. Preparatory cultivation practices like, field preparation, ploughing using cattle, farm yard manure, etc. have undergone changes. Farmers prefer to use mechanized tools like tractor for field preparation. Manual engagement in field preparation has been reduced. Similarly usage of farm yard manure has considerably gone down and replaced by chemical fertilizers. Seeds are now procured from market instead of depending on own seeds. No farmer is reported to be using own preserved seed (except in turmeric). Farmers are more inclined to use insecticide and weedicide in the control of pests and weeds. Farmers prefer to depend on external sources of information on methods of pest control than the traditional knowledge. Farmers now prefer to apply weedicides instead of manual weeding in a majority of the crops.

On the other hand it was also observed that farmers prefer to apply their traditional knowledge in certain farm practices. For example, rituals associated with

crop practices like sowing and harvesting are still practiced. Although the intensity of the rituals has been reduced but farmers still observe them praying for a good harvest. However, rituals associated with the livestock, particularly cattle have been missing. As the cattle population itself has gone down farmers' orientation to rituals associated with cattle is on the verge of extinction. Earlier, it was observed by elder farmers in the village that, farmers used to perform several rituals which place cattle in the centre stage. They also suggested that young farmers in the village will no more learn these rituals as farmers in general in the village are disinclined to be engaged in cattle rearing.

It was observed in the study that there are crop specific practices which use traditional knowledge and scientific knowledge. For example in turmeric cultivation farmers predominantly use traditional knowledge than scientific knowledge. Usage of farm yard manure, cattle for ploughing, and non-pesticidal control measures were observed in turmeric crop. Most of the practices of turmeric cultivation are traditional in the sense that farmers acquire them through learning from elders and other farmers over generations. The impact of modern scientific knowledge is not so much in the case of turmeric crop. However, in the case of cotton, paddy, maize and other crops grown in the village have been impacted by the modern scientific knowledge.

It may be observed that the knowledge systems in the study village are multiple. There is a blend of both, traditional and modern knowledge coexisting in the village. Among young and middle farmers the intensity of dependence on scientific knowledge is more when compared to senior farmers. Similarly the intensity of traditional knowledge application in turmeric crop is more than in other crops. However, it may be said that the disposition toward agriculture among farmers is moving from polyvalent to monovalent knowledge form.

The point the thesis attempts to put forth is that the traditional knowledge evolved in the village and which is available with senior farmers is polyvalent. In other words the cultivation practices adopted by these set of farmers are not just aimed at productivity and yield but also aim at overall wellbeing which includes soil health, soil biota, environment, local climatic and resource conditions. However, the middle and young farmers' priority is high yields without bothering about other aspects related to cultivation like soil, environment, etc. Pluralistic knowledge forms are thus observed in a limited sense in certain crop practices and among certain set of farmers.

Table No 5.6: Inventory of operations and farmers' preferred practices for different crops

Crop	Field Preparation	Ploughing	Seeds	Use of Farm Yard Manure	Use of Fertilizers	Mechanization and automation	Usage of Pesticides/ fungicides/ weedicides
Paddy	Machine	Machine operated	Sourced from outside the village	Low to NIL	High	Machines used for harvesting	High
Cotton	Machine	Machine operated plough	Sourced from outside the village	Low to NIL	High	Manual picking	High
Turmeric	Manual	Cattle drawn ploughs	Own seeds or sourced within the village	High	Low	Manual	NIL
Maize	Machine	Machine operated plough	Sourced from outside the village	Low to NIL	High	Manual harvesting and machine usage in separating grains from cob	High
Mirchi	Machine	Machine operated plough	Sourced from outside the village	Low to NIL	High	Manual picking	High

Table 5.6 presents the inventory of operations and farmers' preferences between traditional knowledge based and scientific ones for different crops. It may be observed that practices related to turmeric cultivation have not been affected much by the modern sources of knowledge. However, significant changes have occurred in the farmers' preferences for practices in other crops like cotton, paddy, maize, etc. The practices performed in these crops have undergone changes in tune with the contemporary agrarian scenario in the region. The region witnesses severe form of agrarian distress. Owing to the reasons like non availability of other forms of knowledge, incompatibility of the traditional knowledge to the emerging trends in crop production and operations, increasing anxieties associated with yields and credit purchases, unsustainable market prices, etc. farmers in the study village prefer to adopt practices as suggested by external sources.

Chapter-VI

Conclusion

Since 1960s Indian agriculture witnessed tremendous changes, the reasons for which are attributed to the introduction of green revolution. The strategy of green revolution, use of high yielding variety seeds, chemical fertilizers and augmentation of irrigation facilities, in fact, impacted rural social structure wherein peasants evolved into farmers. Green revolution based technological paradigm replaced conventional practices characterized by subsistence farming. Mechanization of cultivation operations, introduction of new crops, competitive crop cultivation have been the key factors contributing to change in the Indian agriculture in the later phase of the green revolution. Labeled as modernist, rational and scientific, the introduction of such changes gained legitimacy not just with the state apparatus but also in the larger socio-cultural milieu in rural India.

Dhanagare (1987) describes green revolution as an ideology which advocates the practice of large scale application of modern science and technology in agriculture. At a broader level, it is understood as an ideology aimed at rural transformation. It was envisaged that such transformation leads to the betterment of rural people as well as nation at a larger level. However, in the process of change, as Parayil (1992) observes, green revolution replaced one way of life with another. The peasant cultivators became farmers for whom agriculture was a calling beyond subsistence. Replacing the subsistence farming, green revolution in a way advanced market interests in rural areas, thus making the farming community vulnerable.

The agricultural knowledge before being scientized was local specific, communitarian, open and embedded in the culture. Knowledge was local specific in the sense that cumulative knowledge was developed based on trial and error of farmers in that region. It addressed the concerns of farmers with relation to suitable

seeds, methods of cultivation, pests and diseases, etc. It was communitarian because it evolved through collective enterprise of farmers. Such knowledge was available to all the farmers of the region either directly or indirectly. The local knowledge was also embedded in culture as many practices of cultivation are closely intertwined with religious, cultural, and ethical dispositions of the farming community of the region. With the adoption of green revolution, such knowledge became irrelevant to a great extent.

Changes in the content of inputs altered the contours of knowledge of cultivation radically. Inputs such as improved seeds, fertilizers, insecticides, herbicides, and use of mechanical power have become important factors of cultivation in the green revolution paradigm. And knowledge about these new inputs became obligatory. They have substituted organic manure, animal power and farm retained seeds. The knowledge system that evolved in sync with nature – soil, living organisms, water, etc., over centuries has been rendered irrelevant as external input intensive agriculture made into the technological frame of farmers. Indigenous knowledge in agriculture is a cumulative body of practices evolved the over centuries based on observation and experimentation. Indigenous knowledge reflects the technological frame of the given culture or society. It is passed down from generation to generation through social and cultural structures and practices. With the introduction of the green revolution paradigm and the commercialization of agriculture, the shift from indigenous practices to the scientific knowledge based practices has taken place.

The study was conducted in Nainala village in Warangal district of Telangana which falls under the semi-arid tropical climate zone. The village has a long history of agriculture as its major occupation. It is located about five kilometers from the lowest revenue headquarters indicating the greater amount of exchange of communication with the outside world. For decades, farmers in the village have been

cultivating multiple crops in irrigated and dry land. Major crops grown in the village are paddy, maize, cotton, turmeric. Crops are cultivated in both seasons, namely Kharif and Rabi.

The study adopted the constructivist framework to understand the changing preferences in cultivation of different crops. It proceeded with the assumption that the larger socio-cultural milieu provides technological frame to the farmers to make decisions. The technological frame which prevails in the village influences farmers' preferences for practices, whether traditional or scientific. The study also attempted to test the hypotheses that agricultural knowledge is increasingly becoming monovalent, factors for such shift are located in the technological frame, and traditional knowledge has been polyvalent whereas modern scientific knowledge is monovalent. The social constructivist method provides scope for in depth and intensive understanding of practices and sense making by social actors in a given situation. The study adopted constructivist as it attempted to explain social conditioning of actions vis-à-vis cultivation by farmers. Research methods like survey or interview method would have provided insights to the level the researcher can account for. Beyond a certain point these methods wouldn't help to understand the social bases of actions. The constructivist account helped researcher to interact intensively with the farmers in various settings, like, common public places in the village, farmers' fields, during the time of rituals, weekly markets, traders' shops, banks, etc. Everyday chores, mundane activities of the farmers were explored without influencing the research setting.

Historically, cultivation practices in the study village were observed to have evolved within the community of farmers over a period. With the introduction of commercial agriculture in the village there has been a significant shift in the cultivation practices and the approach of farmers towards cultivation. The study observes that the adoption of scientific practices, as recommended by the

agricultural scientists through the extension wing of the state department of agriculture, is varied and contextual. The adoption of modern practices which has become essential in the process of cultivation on commercial lines is influenced by several factors which are located within the socio-economic domain.

It was observed that farmers' practices or knowledge of such practices is not directly received from the extension personnel or agricultural scientists. Rather, it came through several sources like progressive farmer, input dealer, extension personnel, fellow farmer, etc. Knowledge thus received has undergone several modifications and farmers adopted the practices based on the social, economic and cultural factors. For instance, a small farmer adopts cultivation of cotton (using Bt cotton seed) in dry land (which is rainfed). Cotton cultivation in dry land using high-cost Bt cotton seeds are a risky practice because any delay or unseasonable rain would affect the crop growth and yield drastically. Moreover, the usage of chemical fertilizers for cotton crop, in the absence of assured irrigation is nothing but inviting troubles. However, small and marginal farmers were observed to be adopting such practices in the study village.

The reason for the evolution of such knowledge is located in the technological frame within which farmers as a community carry out cultivation in the village. First of all, in the commercialization of agriculture crop is seen as a means to earn little more money by selling the produce in the market. In other words, cultivation of crops is associated with the economic aspirations of farmers and their families. Related to this is the understanding of farmers on productivity and yield. It was observed that in the interactions between farmers, the discussion always centered on yield. In fact yield was observed to be a key discussion point which is used as a parameter to assess a farmer's social and economic standing. The farmer who gets more yield is privileged over others. As yield is directly linked with the income farmer is going to make, those farmers who reap more yield stands tall

among fellow farmers in the village. Those who cannot make such yield attempts to emulate the successful one without bothering to look at his/her economic and farm conditions.

The technological frame that evolved over a period, after the introduction of commercial agriculture was observed to have influenced other practices of cultivation. The technological frame within which farmers operate now has replaced the earlier notions of cultivation rooted in tradition. It was observed that all the farmers, irrespective of caste, size of land holding and educational background have been using chemical fertilizers to augment yield. Farmers use chemical fertilizers to increase productivity per acre and yield per acre. All farmers in the study village use chemical fertilizers, although they are aware of the increased cost of production. It may be mentioned that farmers associate chemical fertilizers with more yield.

What is interesting to note here is that farmers are also aware that continuous usage of chemical fertilizers depletes soil quality over a period. They have reported their observation on soil losing its fertility levels in the last two to three decades. In spite of this, farmers were observed to be using chemical fertilizers in order to increase yield. It was also observed that farmers are aware of the beneficial impact of the organic fertilizers like farm yard manure, green leaf manure, etc. All the respondent farmers suggested that organic manure enriches soil fertility. But they reported that, the result, in terms of high yield, is witnessed after continuous usage of organic manure for a long time. It was observed that while the senior farmers are well aware of the potential of organic manure as they use it regularly in the field, the young farmers are more interested in instant results thus were observed to be using chemical fertilizers. Awareness on the benefits of organic manure among young farmers was observed to be considerably low when compared to senior farmers.

It was also reported that the young farmers find it convenient to apply chemical fertilizers than organic manure. They view that preparation of organic manure, transferring it to the field and its application requires more man power and time. They were observed to be weighing the advantages in terms of time they spend on the operation and the time taken for the results. As organic manure application requires more time and labour, and also that it doesn't give instant results young farmers prefer chemical fertilizers which can be sourced instantly (in a day or two) and which gives instant results (in terms high yield). It was observed that the young farmers are not aware of the long term benefits of organic manure. The other reason that contributed to the declining interest in organic manure among farmers is the non-availability of it in the village. This factor is linked to social change that is taking place in the village context. With the disintegration of joint families, farmers living with spouse and children show little interest in maintaining cattle. Joint family allowed sparing of some members in the family to take care of cattle. In the nuclear family farmers find it difficult to rear cattle along with cultivation. It may be said that the trend is towards decoupling of cattle rearing and farming.

Interestingly the trend was observed even in the case of small and marginal farmers. Particularly the young farmers are more reluctant to maintain cattle. A senior farmer observes that cattle rearing require a complete time of at least one person in the family. It was also observed that in most of the families of small and marginal farmers, women are reluctant to be engaged in cattle rearing. It was observed that owning cattle is no more associated with status in the village. In fact, it acts in reverse. Those farmers who still own cattle are seen as traditional and backward. Cattle have been replaced by tractors. This was observed in the study village where every farmer, irrespective of land holding preferring to use tractor for all the ploughing operations. It was observed that not many farmers in the village use cattle drawn plough and instead use tractor. It was reported that time was seen

as the critical factor. As the time taken for ploughing by tractor is less when compared to cattle, farmers prefer the former. It may be mentioned that farmers prefer spending less time in farm operations.

Knowledge disposition towards pest management has witnessed a significant change over the years in the study village. Farmers were observed to be aware of the pesticides to control insect pests and fungicides for diseases on crops like paddy, groundnut, chilli, cotton, etc. Among the crops for which pesticides are used cotton stands at the top followed by chilli. Paddy and groundnut are also cultivated using pesticides, but to a lesser extent. Among the respondents young farmers were observed to be using more pesticides than senior farmers. The reasons for more usage were observed to be time, efficiency, and availability of material. Young farmers reported that chemical pesticides are available in the market and are easily procured. Application of pesticides involves spraying of the chemical pesticide in the recommended dosage. However, it was observed that farmers seldom follow the recommended dosage. Most of the young farmers were observed to be using more than required. What is important from the point of view of the present work is that despite the lacunae or gaps in the knowledge available with farmers with regard to the usage of pesticides, all of them view it as an easy method to control pests. Knowledge about the alternative methods of pest control like trap crops, lighting fires in the night time, crop rotation has been declining. Some senior farmer respondents mentioned the usage of trap crops like marigold, castor, etc. in different crops, particularly in cotton. However, with the advent of pesticides farmers never bother about such knowledge as they feel that pesticide usage gives superior effect than other methods. Although the externally sourced pesticides cost more, farmers prefer them as there is an instant result. In their anxiety to get more yield farmers tend to favour practices which give immediate results. The traditional knowledge available with senior farmers has become irrelevant in the present context, not

because that the methods are ineffective, but the absence of instantaneous results, and lack of ready availability of material when compared to pesticides.

There is also a substantial difference in the cropping pattern observed in the village. If the earlier cropping pattern was in tune with the geographical and climatic conditions today farmers feel that crops which are remunerative in the market are important. Hence, over the last three to four decades, farmers have started cotton cultivation in large scale. Most importantly, the spread of cotton cultivation into dry land has been witnessed. This also exemplifies the importance farmers attach towards cash crops than crops which are suitable to the soil and climate.

It may be said that there is a perceptible change in the understanding of farmers towards crops and their cultivation practices. The change is prominent in the usage of seeds, chemical fertilizers, pesticides, and in the cropping pattern. Mechanization or use of tractors in cultivation has been on the rise. Notions on cattle, use of organic manure, non-pesticidal control of pests, etc. have been witnessed to be declining in the study village. These changes are the resultants of evolving knowledge forms among farmers. The reason for the evolution of such knowledge is located in the technological frame within which farmers operate. The knowledge which privileges time, efficiency and productivity has replaced the knowledge which was sustainable and in tune with nature. It may also be said that the technological frame, which guides the thinking and actions of farmers, has evolved as a result of changes in the wider social and economic context. In other words, increasing nuclear families in the village caused the decline of cattle population and the increased usage of chemical fertilizers. Similarly, commercial cultivation emphasises on yield rather than the long term impact of inputs on soil fertility.

It was observed that there is a significant change in the disposition of farmers, particularly young farmers, towards cultivation. First, they see cultivation as an

entrepreneurial activity with the sole aim of making more money by increasing yield. Second, soil is viewed as mere medium for cultivation without bothering about the fact that it is a host to many beneficial biological organisms. Third, decoupling of cultivation from cattle rearing. Cattle rearing is seen as a time consuming burdensome activity with limited returns. The beneficial effects of cattle are ignored. Fourth, time spent on cultivation practices. Farmers, particularly the young farmers, are disinclined to spend more time in the farm or on cultivation related activities, and hence the increased usage of tractor, chemical fertilizers and pesticides.

However, what is important to note is that such change was not witnessed with respect to turmeric crop cultivation. Turmeric is still grown with organic manure, without using chemical fertilizers and pesticides. Majority of the practices in turmeric are traditional. Turmeric crop cultivation has not witnessed changes of same level as in the case of other crops. This was observed across all sections of farmers in the village. It may be said that non-availability of modern scientific knowledge on turmeric could be one of the reasons for continuation of traditional cultivation of turmeric. Another reason, as was observed in the study, was that farmers associate turmeric with certain beliefs located in religion. Turmeric is seen as a sacred crop since it is used in all religious and auspicious occasions by Hindus. A closer observation revealed that farmers' traditional knowledge on turmeric has not been affected by the modern scientific knowledge because of lack of emphasis on the latter by the extension services. Moreover, the agribusiness corporate companies have not shown great interest in turmeric crop.

The thesis finds that there is a shift in the knowledge base of the farmers from the one that considered all aspects of cultivation, namely, soil, crop, other biological organisms, environment to the one that considers yield alone. If the traditional knowledge focused on the optimum usage of all the inputs of cultivation the scientific knowledge focused on maximum usage of input for maximum yields. The

knowledge that evolved over centuries recognizes the limitations set by nature on cultivation. However, modern scientific knowledge in agriculture views cultivation in terms of factory production. The scientific knowledge emphasises higher yields ignoring the cost of cultivation or suitability of certain practices. Thus, it may be said that the emerging knowledge form is monovalent in the sense that it focuses only on yield while the traditional knowledge was polyvalent as it emphasized on the holistic approach to cultivation. The nexus between nature and its flora and fauna, climate (rain fall) of the region, cattle and associated animals, and farmers has been broken. The 'Taylorizaiton of agriculture' that has crept into the villages emphasizes on yield, and time spent of cultivation operations.

The study finds that the knowledge base of farmers is increasingly becoming monovalent. In other words farmers have access to only such knowledge which privileges yield. The technological frame within which farmers make decisions is oriented to achieving high yields. This situation was found to be varying in intensity across crops and across farmers' experience in cultivation. Crops which are popularized by state in terms of scientific knowledge have witnessed significant changes than those crops which are not emphasized by the state machinery. Knowledge base in these crops is becoming monovalent. For example, turmeric was found to be still cultivated using traditional knowledge which is polyvalent. Farmers who have witnessed cultivation practices before the introduction of green revolution based cultivation practices seem to have polyvalent knowledge base when compared to young and middle level farmers. The erosion of knowledge base which is polyvalent is intense. The thesis observes that unless due emphasis is given to practices which are polyvalent young farmers wouldn't be able to think is those lines which are beneficial to farmers, soil and environment. The thesis also highlights that conscious attempts have to be made at collective level in order to change the technological frame. It is being realized that even if a farmer wants to adopt

traditional knowledge based practices s/he will not be able to do so as the technological frame is oriented only towards yields. As farmers observed in the study, the non-availability of farm yard manure is forcing young farmers to use chemical fertilizers. It may be said that plurality of knowledge is found in the study village as senior farmers still wish to cultivate using traditional knowledge. However, if the state support to monovalent scientific knowledge at the cost of polyvalent traditional knowledge is continued it would definitely lead to singular knowledge base which may not be polyvalent in nature. Activist scientists belonging to crop sciences argue for sustainable practices which are best suited to the situations of rainfed cultivation in small and marginal land holdings. Advocates of sustainable cultivation practices however, fail to recognize the growing anxieties among farmers, particularly, young belonging to small and marginal land holding categories. State's blind eye to certain suggestions from these advocates like subsidies to farmers who use farm yard manure or other manures instead of chemical fertilizers would only add to the woes of agriculture in the years to come.

The thesis also finds that although modern scientific knowledge is privileged, traditional knowledge has not been replaced completely. The displacement of traditional knowledge was appeared to be varied across the spectrum. Senior farmers who have seen the cultivation before the entry of green revolution are more inclined to preserve the traditional knowledge. It was witnessed that this section of farmers still follows certain practices which are labeled as traditional. However, young farmers, who entered into cultivation after the beginning of green revolution, are disinclined to adopt the traditional practices not just because of the fact that they have not witnessed the beneficial results of traditional knowledge but also because of their anxiety for getting more yields. They were observed to be associating traditional knowledge with low yields. The adoption of practices was also influenced by the crops cultivated. As witnessed in the case of turmeric in which traditional

knowledge based practices are followed while crops like cotton, chilli, etc. are cultivated using modern practices. Thus, it may be said that within the field setting where the study was conducted plurality of knowledge forms exist.

In the process of prioritization of productivity and yield, which got into the technological frame of farmers, indigenous knowledge appears to have become irrelevant or inadequate. Empiricist positivist green revolution paradigm substituted the knowledge that is non-positivist, holistic. The erosion of the traditional knowledge base in cultivation is gradual and significant. In certain crops like paddy, wheat, maize, cotton the use of traditional knowledge is marginalized to a great extent while in crops like turmeric it still plays a significant role. It is of sociological importance to examine how in crops like turmeric traditional knowledge is still found to be relevant. Given the same geographical conditions, how in some crops scientific knowledge based practices made deep inroads while in turmeric crop traditional knowledge is privileged over scientific knowledge. Adopting a constructivist method the thesis attempted to understand the social and cultural factors in the cultivation of crops. Through an empirical examination of cultivation practices of crops from a comparative perspective, the thesis brought out the significance of technological frame in influencing farmers' understanding towards cultivation practices. The thesis finds that the evolving nature of knowledge is monovalent in the sense that it focuses only on yield replacing the polyvalent knowledge that was holistic.

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Appendix-I

Schedule used for data collection

1. Name of the respondent:
2. Age:
3. Sex:
4. Marital Status:
5. Caste:
6. Experience in cultivation (in years):
7. Educational Qualification:
8. Household information:

S.No	Name of the household	Age	Gender	Education	Occupation	Extent of land owned (Wet/Dry)	Annual Income	Other information
1								
2								
3								
4								
5								
6								

9. Reasons for being in cultivation of crops
10. Land ownership and details of land
11. Membership into groups in the village (eg. Rythu Mitra, etc.)

12. Crops cultivated

13. Farm equipment owned by the farmer

14. Practice of soil testing

    a. If yes, mention the period of interval

    b. If not specify the reasons

15. Usage of tractor or country plough for ploughing operations

16. Usage of seeds

17. Seed procurement

18. Decision making with regard to selection of seeds.

19. Practices of crop rotation

20. Reasons for preferring certain crops

21. Usage of fertilizers

22. Decision making with regard to selection of fertilizers

23. Usage of pesticides

24. Decision making with regard to selection of pesticides

25. Usage of manure

26. Knowledge on weather

27. Knowledge on market situation

28. Knowledge on cultivation practices beneficial for soil and environment

29. Sources of agricultural information

30. Sharing of agricultural information

31. Perception of farmer with regard to changes in agriculture

32. Any other information

Appendix-II

Phographs taken during the study

Board indicating the name of the village (in Telugu)

Woman ploughing for turmeric cultivaiton

Young farmer in his Paddy field (male female lines)

Senior farmer –turmeric seed material preserved for the next crop

Hindu deity – in the field

Dargah in the field

Offering hen before the harvest of paddy crop

Tractor drawn mould board plogh for ploughing

Temple at the top of the Hill

Researcher at the Field Site