Report of Research study

on

Assessment of Economic and Ecological Returns From Millet Based Bio-diverse Organic Farms vis-à-vis Conventional Farms

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Chapter 1

Assessment of Economic and Ecological returns from millet based bio-diverse Organic farms Vis-à-vis Conventional farms

Back ground of the study

Green Revolution(GR) technologies, supported by policies, and fuelled by agrochemicals, machinery and irrigation, are well known to have enhanced agricultural production and productivity. While these technologies greatly helped to address food security and food sovereignty needs, farmers using this technologies, have to depend on external inputs which constitute the major cost of production for small-holder farmers. Most of these small farmers are challenged by shortage of cash resources and depend on family labour.

The manufacture of fertilizers and pesticides, the two major inputs of GR technologies, needs fossil fuels and/ or expensive energy, and is associated with serious environmental and health issues. It is perhaps owing to these input issues and their negative impacts, intergovernmental panel on climate change(IPCC) has noted that agriculture as practiced today(conventional agriculture, modern agriculture or GR agriculture) accounts for about one fifth of the projected anthropogenic greenhouse effect, producing about 50% and 70%, respectively of overall anthropogenic CH4 and N2O emissions.

The modern agriculture farming practices and irrational use of chemical inputs over the last four decades resulted in loss of natural habitat balance, loss of soil health and caused many hazards like soil erosion, decreased ground water level, soil salinisation, pollution due to fertilisers and pesticides, genetic erosion, ill effects on environment, reduced food quality and increased the cost of cultivation, making the farmer poorer from year to year (Balak Ram 2003). As a result of all these things, farmers find that agriculture is no more viable proposition and infact a large number of farmers committed suicides (Deshpande, 2002). Perhaps shooting up of price of factory made external inputs and the government slow with drawl of investment as well as market intervention and more significantly, shifting of subsistence farming (mainly with homegrown inputs) to commercial farming(largely with purchased inputs) would have also contributed for the present crisis. In other words, the local indigenous farm techniques have been wiped out and replaced by the modern techniques that would have resulted unviable and unsustainable farm enterprise. It is in this context that

alternative farm techniques and strategies for growing crops ought to be found in the larger interest. Owing to the merits of organic cultivation as compared to modern agricultural practices, such principle is attracted across the world. Organic agriculture is productive and sustainable (Reganold et al, 1993, Drinkwater etal, 1998, Mader et al 2002, Murata and Goh 1997, Letourneau and Goldstein 2001). Much state supported agencies, Non-governmental organizations (NGOs) and individuals started experiments on organic methods of food production in the recent past.

The popular and most accepted definition of organic farming is **"**Organic agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using where possible, agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system", (FAO 1999). The term "conventional farming" refers to a production system which employs a full range of pre- and post-plant tillage practices(e.g, plough, discplant, cultivate), synthetic fertilizers and pesticides. Conventional agriculture basically refers to a system of agriculture where in chemicals are used in cultivation of crops. It is characterized by a high degree of crop specialization. By contrast organic farming is characterized by a diversity of crops.

Against this back ground, organic farming has assumed immense significance in the present context, especially in the dryland areas. Organic farming follows the principles of nature, which are self sustaining developing systems. It respects the environments own systems for controlling pests and diseases in raising crops and livestock, and avoids the use of synthetic pesticides, herbicides, chemical fertilisers, growth hormones, antibiotics or gene manipulation. In this context a study is proposed in colloaboration with an NGO TIMBAKTU Collective to understand the "Economic and Ecological returns from Organic farms Vis-à-vis Conventional farms" in Anantapur district of Andhra Pradesh with the following objectives.

Objectives of the study

1. To identify and record the organic farming practices followed by farmers.
2. To examine the economic, ecological, social and livelihood significance of organic farming practices and conventional farming.
3. To understand the marketing methods in organic farming.
4. To formulate policies that help micro level interventions in organic farming.

Methodology

The study used both qualitative and quantitative methods for assessment of economic and ecological returns from millet based bio-diverse Organic farms Vis-à-vis Conventional farms. It used both primary and secondary sources of data. Quantitative information was collected using a semi-structured questionnaire and qualitative information was collected through focused group discussions. This research aims at uncovering the range of strategies adopted by farmers on their land, with a view to assess their socio-cultural, livelihood, economic and ecological significance. The study used an *Ex-post facto* research design since the variables chosen have already occurred.

Locale of the study

The state of Andhra Pradesh was chosen for the study which is the fifth largest state in India interms of both surface area and population. Based on physiography, soil types, crops and cropping pattern the state has been divided into nine agroclimatic zones namely high altitude and tribal zone, North coastal zone, Godavari zone, Krishna zone, Southern zone, Northern Telangana zone, Central Telanga zone, Southern Telangana zone and Scarce rainfall zone.

The state is richly endowed with natural resources and has a geographical area of 274.40lakh hectares and an estimated population of 8.16 crores as on 1st March 2006. The population of SCs and STs works out to 16.19 and 6.59 percent respectively. The literacy rate in A.P during 2001Census was 60.47 percent as against the literacy rate of 64.84 percent at all India level. The average land holding size in the state according to the quinquenial census of 2000-01 was 1.25 hectares. About 70 per cent of the state's population are engaged in agriculture.

Over 80 percent of those involved in agriculture are small and marginal farmers and landless labourers who own a mere 35 per cent (3.5 million hectares) of the total 10 million hectares of cultivated land. About 20 million bovines (cattle and buffaloes), 15 million sheep and goats, 0.75 million pigs and 65 million poultry are spread across some 10 million households engaged in agriculture. Andhra Pradesh has the distinction of much diversified livestock resources in nine agroclimatic zones with different production systems. Livestock farming is one of the most sustainable and dependable livelihoods as an alternate to their dependable resources in rural areas, especially for small and marginal farmers and agricultural labourers who hold 70 percent of livestock resources and 20 percent of land holdings. Small ruminants

and backyard poultry are reared primarily by the landless adivasi, the traditional small-ruminant farming castes such as the kurma and the golla, and the dalits. The size of bovine herd is closely linked to private land ownership, with the number of bovines increasing with land holding size. In all agricultural settings across AP, women play a greater role than men in agricultural work and food preparation, looking after almost 80 per cent of the day-to-day livestock management. During 2005-06 the net area sown was 104 lakh hectares constituting about 38 percent of its geographical area. Similarly the state has about 62lakh hectares of forest area. Gross area irrigated in A.P during the year 2004-05 was 49.87 lakh hectares. Wells account for a major share of 25.63 lakh hectares (51.4 percent) followed by canals, 17.30lakh hectares (34.7 percent) and 5.15lakh hectares under tanks (10.3 percent). Highest ever priority has been accorded for the development of irrigation infrastructure in backward and drought prone regions of the state. The state government has initiated a historical mission named 'JALAYAGNAM' with the aim of completing 30 ongoing and new projects in a record time. State also had a project for encouraging micro irrigation for achieving water use efficiency. In 2005-06 the area under drip/sprinkler irrigation is 43,876 hectares.

The average rainfall of the state is 830mm, the range being 690mm (Rayalseema region) to 950mm (coastal Andhra). The average rainfall of Telangana region in the state is 860mm. Cereals occupy a lions share under crops (46.5 percent of total area) followed by oil seeds crops (24.1 percent), pulses (12.4 percent) and commercial crops (11 percent). Rice in cereals, groundnut and castor among oil seed crops, cotton, chillies and sugarcane in commercial crops and blackgram, redgram and green gram among pulses are the major crops grown in the state. An area of 15.80 lakh hectares is under various horticultural crops. Mango and sweet orange occupy predominant position in acreage under fruits besides vegetables and flowers.

In Andhra Pradesh agriculture has been undergoing many changes over the past two to three decades. The increasing intervention of the state in agriculture, and the Green and Yellow revolutions, have prompted agricultural changes throughout the semi-arid regions especially in land ownership, cropping patterns, irrigation, credit and extension, agricultural productivity and prices, and marketing. In rainfed areas, the shift to commercial crops like groundnut, cotton and chillies is resulting in the use of modern inputs like hybrid seeds, chemical fertilizers and pesticides, all of which are produced through industrial methods and marketed through networks of public and private dealers. The wide spread cultivation of commercial crops is accompanied by a decline in food crops. Traditional crop rotation

practices and the use of organic manures have largely been replaced by monocropping and the intensive use of chemical fertilizers. These new cropping practices have led to an initial rise in productivity, but they also translate into significant increases in costs of production and severe environmental and health problems, including pollution of water bodies.

Agricultural development is set in motion by institutions ranging from government bodies to local agents who carry an inherent bias in favour of well-off and large farmers. The combination of technology and institutional bias towards 'progressive' farmers places non-literate and socially marginalized small cultivators at a great disadvantage. The current trend towards a reduction of government extension services and the introduction of private paid services may further increase small farmers' technological and financial dependence on profit-driven agencies.

Farmers' increased dependency on the state on the one hand and the market on the other are major causes for the 'agrarian crisis' highlighted by a citizens report prepared by a group of social scientists in warangal district (citizens' report, 2004). Agriculture in the semi-arid regions has to be understood not only in the context of vulnerability and resource scarcity, but also resilience and adaptations. Industrial and technological transformations are reshaping the agrarian relations and rural livelihoods.

A.P is one of the highest pesticide consuming states in India with an intake of 2133 Metric tones (Technical grade) in 2004-05. Similar is the case with fertilizer consumption. The use of fertilizers too was high in A.P. In the year 2004-05, 11.57, 5.39 and 2.92 lakh metric tons of Nitrogen(N),Phosphorus(P) and Potassium(K) was used respectively. In 2004-05 total NPK per hectare consumption was 158.80Kgs (CMIE, 2006) as against the India's 88.11 kgs/hect (Feriliser Association of India). The state has 2.03lakh Rythu Mithra Groups (RMGs). It also has a programme called POLAMBADI (Farmer Field School) emphasising on the adoption of eco-friendly measures for pest management which helps in strengthening the natural eco-system. There are several private companies promoting their technology and business regarding seeds, pesticides, fertilizers and farm machinery. All the above mentioned aspects have a huge bearing on the organic farming. It was in this context that Andhra Pradesh was selected for the study on "Assessment of Economic and Ecological returns from millet based bio-diverse Organic farms vis-à-vis Conventional farms" focusing on the socio-economic, ecological and livelihood dimensions of organic farming practices in dryland regions of Andhra pradesh.

Profile of selected district

Out of 23 districts of Andhra Pradesh, Anantapur district having arid and semi-arid regions was selected for the study. The district represents one of the important socio-economic and ecological regions of Andhra Pradesh.

Table 1 : Basic features of the Anantapur district

Particulars	Anantapur
Area in SqKm	19130
Normal Rainfall(mm)	552
Population in Lakh Nos	36.4
a)Male	18.6
b)Female	17.8
Literacy per cent	56.1
a)Male	68.4
b)Female	43.3
Operation holding in hect	2.0
Gross cropped area(04-05) '000 hect	1136.0
Gross irrigated area(04-05) '000hect	142.0
Percentage of Net irrigated area	12.27
Food grains production In '000 tonnes(04-05)	188.0
Food grain yield in Kgs per hectare(04-05)	1102.3
Total Livestock Population	2316329

Source: CMIE 2006 and Government of A.P, 2004

Anantapur district has high inter-annual variations in precipitation. Most of the rain is received during June to September, although recently rainfall has become unreliable and distribution is highly erratic. The soils are mainly shallow, barren, sandy and only marginally fertile. The district is primarily characterised by rainfed agriculture. Most farmers are 'small and marginal' and grow a large diversity of both food and commercial crops (Oil seeds, pulses, millets and fibre crops) using dryland farming practices. Agriculture in Anantapur district of Rayalseema is practiced on degraded and infertile soils with a majority of them being sandy soils. A large percentage of area is under groundnut. Erratic and deficient

rainfall, rising cost of cultivation coupled with low market prices has led to severe indebtedness of farmers.

Interestingly, Anantapur has least area under irrigated rice and highest rural livestock population in Rayalseema region. Large flocks of goat and sheep are managed extensively in the district. Certain parts of the district have a significant population of Adivasis (known as Scheduled Tribes), who are among the most marginalised sections of Indian society.

Table 2: Land Utilisation in A.P and selected districts in 2006-07(percentage)

Land use	Andhra pradesh	Anantapur
Forests	22.59	10.28
Barren and uncultivable land	7.59	10.28
Cultivable waste	2.53	2.70
Pastures and other grazing land	2.46	1.79
Tree crops	1.01	1.98
Current fallows	10.27	2.44
Other fallows	6.01	6.05
Net area Sown	38.01	55.98

Source: Statistical Abstract, A.P,2008, Directorate of Economics and Statistics, GoAP,Hyderabad.

Study area

The study was done in 8 villages covering C.KPalli, Ramagiri and Roddam mandals of Anantapur district (table no3). TIMBAKTU(N.G.O) working in Anantapur districts of Andhra Pradesh. From total number of organic farmers (350) a sample of 75 organic farmers was selected from total organic farmers of 8 villages using proportionate random technique. Correspondingly number of conventional farmers were selected using proportionate random sampling method representing similar dryland conditions except that of their organic farming practices. Along with personal interviews, Focused group discussions were used to acquire an indepth understanding of issues relevant to organic farming. A thorough review of organic

farming policies was conducted through a study of secondary sources. The data gathered was analysed using both qualitative and quantitative methods.

Table 3 : Study area in Anantapur district of Andhra Pradesh

S.No	Mandal	Village	No of Sample Households	
			Organic farmers	Inorganic farmers
1	Roddam	Rachur	15	16
2	Roddam	Beedanpalli	5	4
3	Roddam	Shapuram	11	11
4	C.K.Palli	Venkatampalli	12	10
5	C.K.Palli	Chinnapalli	5	9
6	Ramagiri	Kondapuram	13	9
7	Ramagiri	Venkatapuram	7	6
8	Ramagiri	Gantimarri	11	10

Methods of Data collection

Secondary data on rainfall, net irrigated area and demographic features of the villages were collected from mandal revenue office and village panchayat records. A thorough review of past and current trends in agricultural policies was conducted through a study of secondary sources. Structured questionnaire was used to collect the data from the selected sample households of eight selected villages. The interview schedule, comprising the measurement of variables was prepared in consultation with experts, keeping in view the objectives of the study. The interview schedule was pre-tested in one of the village in an identical village outside the present study. In the light of the experience gained in the pre-testing, suitable modifications were made before finalizing the interview schedule.

Enumerators were used for collecting the information through individual questionnaire[1]. In the beginning enumerators were given one week of training on how to canvas the questionnaire and aiding them in understanding general issues of organic farming.

The questionnaire was divided into 5 sections. The first section is general information about the households family particulars (family members, age, sex, social category, education, role

[1] Questionairre is given in appendix.

in household activity and occupation), membership in organization, farming experience and sources of income. Second section is about land holding details regarding total operational land, grazing land, fallows, land use in Kharif 2007-08, details of organic farming practices. The third section focused on crops grown, livestock details and input used in both conventional and organic farming 2007-08.

The fourth section is about details of inputs used. Section five discusses about the problems in marketing of organic products, credit sources of farmers, migration details, sources of farming information, constraints in organic farming and suggestion for the growth of organic farming. Village basic information was obtained using a questionnaire administered to the village panchayat secretary of the selected villages and the Mandal revenue office of the respective mandal.

Individual questionnaire

Structured questionnaire was used to collect the data from the selected sample households of eight selected villages. The interview schedule, comprising the measurement of variables was prepared keeping in view the objectives of the study. The interview schedule was pre-tested in one of the selected villages in an identical village outside the present study.

Enumerators were used for collecting the information through individual questionnaire. In the beginning enumerators were given 3 days training on how to canvas the questionnaire and aiding them in understanding general issues of organic farming. After the training exercises, a trial short field visit was undertaken to provide hands on training to the enumerators. This was useful for enumerator to get to know the local conditions and clarify further doubts on the concepts used in the questionnaire.

Focused Group Discussions(FGDs)

FGDs were done with both organic and inorganic farmers of all size classes. The objective of these discussions was to have general idea on organic farming related issues irrespective of farm size. FGDs helped to understand the livelihoods, ecological and marketing issues in organic farming, different organic farming practices and their advantages and disadvantages. This helps to bring out the perspectives of various categories of people with reference to issues related to organic farming.

Methods for data analysis

Both quantitative and qualitative information on the details of organic farming and its determinants was gathered. The analysis was basically done in two ways. One is comparing between the various size classes of large, medium and small farmers and the other analysis was done comparing between the organic and conventional farmers. The results of the study are discussed at two levels one at the household level and the other is at the plot level. The data gathered was analysed using different statistical tools. Averages, frequency and percentages were used to analyse the various information related organic farming

Scheme of presentation

The report is organised into 5 chapters. The present chapter is an introduction to this work. In this chapter, the importance of organic farming in the semi-aird regions is discussed. The relationship between livelihoods, crops, livestock and soils is discussed. This is followed by objectives and methodology. The second chapter traces the history of organic farming. Third chapter is a thorough review of the literature on the issues related to organic farming. The Fourth chapter is on socio-economics of soil fertility management. Data on demographic features, landuse patterns, livelihoods, socio-economic aspects of sample house holds. Fifth chapter discusses about the constraints and suggestions expressed by farmers and conclusions of the study.

Chapter 2

History of Organic Farming

Organic farming or natural farming has no doubt emerged from Asian countries like India and China, where agriculture has been the mainstay of people and farmers have nurtured and groomed this art over several centuries. However the organic movement as such began as a reaction of agricultural scientists and farmers against the industrialization of agriculture. Advances in biochemistry, (nitrogen fertilizers) and engineering (the internal combustion engine) in the early 20th century led to profound changes in farming. Research in plant breeding produced hybrid seeds. Fields grew in size and cropping became specialized to make efficient use of machinery and reap the benefits of the green revolution. Technological advances during World War II spurred post-war innovation in all aspects of agriculture, resulting in such advances as large-scale irrigation, fertilization, and the use of pesticides. Ammonium nitrate, used in munitions, became an abundantly cheap source of nitrogen. DDT, originally developed by the military to control disease-carrying insects among troops, was applied to crops, launching the era of widespread pesticide usage.

Gustav Simons (1903) wrote an important book on the relationship between the health of soils, growth of plants and the health of mankind. In Germany, Rudolf Steiner's Spiritual Foundations for the Renewal of Agriculture, (Steiner, 1924) led to the popularization of biodynamic agriculture. The term organic farming was first used by Lord Northbourne. The term is derived from his concept of "the farm as organism" and which he expounded in his book, Look to the Land (1940), wherein he described a holistic, ecologically balanced approach to farming. The British botanist, Sir Albert Howard often referred to as the father of modern organic agriculture worked as an agriculture advisor during 1905- 1924 in Pusa, Samastipur, India, where he documented the traditional Indian farming practices. He came to regard such practices as superior to modern agricultural science. His research and further developments of these methods was recorded in his book, “An Agricultural Testament”(1940), which influenced many scientists and farmers of the day. He adopted Northbourne's terminology in his book,"The Soil and Health: A Study of Organic Agriculture" in 1947.

In 1939, Lady Eve Balfour established the pioneering Haughley Experiment on her Suffolk farmland in England and continued for more than 40 years. It was the first scientific comparison of organic and conventional farming. Lady Eve Balfour, shared some of her experiences in a book called the Organics classic: The Living Soil. Japanese farmer and writer, Masanobu Fukuoka, invented a no-till system for small-scale grain production in the early 1940s and called it "Natural Farming". In the post world war era, the green revolution launched in Mexico with private funding from the US, encouraged the development of hybrid plants, chemical controls, large-scale irrigation, and heavy mechanization around the world. Although science tended to concentrate on new chemical approaches, sustainable agriculture was the topic of interest. In the US, J.I. Rodale (1950) began to popularize the term and methods of organic growing, particularly through promotion of organic gardening. Carson (1962), a prominent scientist and naturalist, published *Silent Spring*, describing the adverse effect of DDT and other pesticides on the environment, launching the worldwide environmental movement. By the 1970s, global movements concerned with pollution and the environment increased their focus on organic farming.

In 1972, the International Federation of Organic Agriculture Movements (IFOAM), was founded in Versailles, France. It is an umbrella organisation for organic agriculture which developed international basic standards for organic agriculture and went on to establish IFOAM accreditation programme (1992) to accommodate certifying agencies and set up international organic accreditation service (2001). IFOAM is dedicated to the diffusion of information on the principles and practices of organic agriculture across national and linguistic boundaries. Fukuoka released his first book, *One Straw Revolution* (1975) with a wide ranging impact on the agricultural world. In the 1980s, various farming and consumer groups worldwide began pressing for government regulation of organic production. This led to legislation and certification standards being enacted beginning in the 1990s. In the year 1991, European Union regulations gave guidelines for the production of organic crops in the European community. Similarly in the year 1999 a joint FAO/WHO intergovernmental body produced a set of guidelines for organic production. Since the early 1990s, the retail market for organic farming in developed economies has grown by about 20 per cent annually due to increasing consumer demand. Though small independent producers and consumers initially drove the rise of organic farming, as the volume and variety of "organic" products grows, production will increasingly be large-scale.

Global Status of Organic Farming

Organic agriculture is developing rapidly and today atleast 141 countries produce organic food commercially. As per the estimates in the year 2007, organic food is produced in about 32.2 million hectares globally, managed by more than 1.2 million producers including small holders. In addition to agricultural land there are 0.4 million hectares of certified organic aquaculture. Among the countries involved in organic farming about 65% are developing countries. The regions with the largest areas of organically managed agricultural land are Oceania, Europe and Latin America (Figure 1). Australia, Argentina and Brazil are the countries with the largest organically managed land areas. About one third of the world's organically managed land – almost 11 million hectares - is located in developing countries. Most of this land is in Latin American countries, while Asia and Africa take the second and third place, respectively.

Figure 1: Land Under Organic Management by Region 2007

Source: FiBL/IFOAM (2007)

On a global level, in the year 2008, organic land area increased by almost 1.5 million hectares compared to the data from the year 2006. About 28-percent (or 1.4 million hectares) more land under organic management was reported for Latin America (including 0.9 million

hectares of in-conversion land in Brazil for which no data was available previously). In Europe, organically managed land increased by 0.33 million hectares (+ 4 percent) and by 0.18 million hectares (+27 percent) in Africa (Willer and Klicher, 2009).

Table 2.1: Percentage of Area Under Organic Farming in the Total Cultivated Area in 2004

Country	Percent of Area Under Organic Farming
USA	0.23
U.K	4.22
Germany	4.10
Argentina	1.70
Austria	8.40
Australia	2.20
Japan	0.10
Switzerland	7.94
South Africa	0.05
Italy	3.70
India	0.03
Pakistan	0.08
Srilanka	0.05

Source: SOEL Survey(2004).

It can be seen from Table 2 that Austria is having highest percentage (8.40%) of area under organic farming. Followed by Switzerland, U,K and Germany with 7.94, 4.22 and 4.10 percent, respectively. In India, only 0.03 % of the area is under organic farming, though there is huge scope for bringing more and more land under organic farming.

Organic Farming in India

India has traditionally practiced organic agriculture, but the process of modernization, particularly the green revolution, has led to the increased use of chemicals. In recent years, however, limitations of agriculture based on chemical use and intensive irrigation have become apparent and there has been a resurgence of interest in organic agriculture. Renewed interest in organic agriculture is mainly due to two concerns, falling agricultural yield in certain areas as a result of, *inter alia* excessive use of chemical inputs, decreased soil fertility

and environmental concerns. Exports also played a role but perhaps lesser than in other countries.

The 10th five year plan encouraged the promotion of and encouragement to organic farming using organic waste, Integrated Pest Management (IPM) and Integrated Nutrient Management(INM) (GOI, 2003). Even the 9th five year plan had emphasized the promotion of organic produce in plantation crops, spices and condiments using organic and bio-inputs for the protection of environment and promotion of sustainable agriculture (GOI, 2001). There are many state and private agencies involved in promotion of organic farming in India. These include several ministries and government departments at both central and state levels, universities and research centres, NGOs like Navadanya, Deccan Development Society, Key Stone Foundation, AME, TIMBAKTU Collective and Organic Farming Association of India and producers organizations and certification bodies besides various processors and traders.

The Government of India has also launched the National Programme for Organic Production (NPOP,2001). The national programme involves the accreditation programme for certification bodies, norms for organic production, promotion of organic farming etc. The NPOP standards for production and accreditation system have been recognized by the European Commission and Switzerland as equivalent to their country standards. Similarly, the United States Department of Agriculture(USDA) has recognized NPOP conformity assessment procedures of accreditation as equivalent to those in the US. With these recognitions, the Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries.

Currently, India ranks 33rd in terms of total land under organic cultivation and 88th for agriculture land under organic crops to total farming area. According to the Agricultural and Processed Food Product Export Development Authority (APEDA), the cultivated land under certification is around 2.8 million hectares (2007-08), which includes one million hectares under cultivation and the rest is under forest area (wild collection). An estimated 69 million hectares, however, are traditionally cultivated without using chemical fertilizers and could be eligible for certification under the current practices, or with small modifications. Certifying these farms remains a challenge, however, as many of these farms are small holdings (nearly 60% of all farms in India are less than one ha). Small-scale, poor farmers may be unable to afford the cost of certification, they may be illiterate and unable to maintain necessary records, or may be using indigenous cultivation systems not recognized in organic certification systems. These farms mainly produce for home consumption, and to supply the

local markets in case of irregular surpluses. Such barriers pose difficulties for farms to reap potential benefits of organic certification.

Table 2.2: Present Status of Organic Production in India During 2006-2007.

Total area under certified organic cultivation	2.8 million hectares.
Total production	585970 M.T
Total quantity exported	19456 M.T.
Value of total export	Rs.30124 Lakhs
Number of farmers	141904

Source:APEDA (2008)

India produced around 5,85,970 MT(Table 3) of certified organic products including all varieties of food products namely Basmati rice, pulses, honey, tea, spices, coffee, oil seeds, fruits, processed food, cereals, herbal medicines and their value added products. This production is not just limited to the edible sector; it includes organic cotton fiber, garments, cosmetics, functional food products, body care products, etc. India exported 86 items last year (2007-08) - a total volume of 37533 MT. The export realization was around US $ 100.4 million, registering a 30% growth over the previous year. Organic products are mainly exported to EU, US, Australia, Canada, Japan, Switzerland, South Africa and the Middle East. Cotton leads among the products exported (16,503 MT).

The states of Uttaranchal and Sikkim have declared their states as organic states. In Maharashtra, since 2003, about 5,00,000 hectares has been under organic farming (of the 1.8 crore ha of cultivable land in the state). Organic cotton production was concentrated in low productivity and high uncertainty areas such as Vidarbha, since the early 1990s. The Vidarbha Cotton Growers' Association, set up in 1994 with 135 members, has tied up with international agencies for exports (GOI, 2001). In Gujarat organic production of chickoo, banana and coconut was found to be more profitable, though field crops and mango had both lower input costs as well as yields (Naik,2001) In Karnataka by the year 2005, 1513.25 hectares was under certified organic farming, and while 4750.00 hectares was under non-certified organic farming. Groundnut, jowar, cotton, coconut and banana are being grown under organic conditions-the major reasons for shift include sustained soil fertility, reduced cost of cultivation, higher quality of produce, sustained

Table 2.3: Export of Organic Products by APEDA for the year 2007-08

Particulars	Quantity in Metric Tonnes	Value in Lakhs
Floriculture	46397.84	48226.71
Fresh fruits and vegetables	1724573.58	243711.57
Processed fruits and vegetables	774849.13	245144.82
Animal products	1932855.99	512926.94
Other processed foods	3220200.63	652314.73
Cereals	9752245.58	1484735.94

Source: Govt. of India(2008b).

yields, easy availability of farm inputs and reduced pest and disease attacks. The Government of Karnataka released a state organic farming policy in 2004. Most of the area in the north eastern states is being used for organic farming. In Nagaland, 3000 hectares are under organic farming with crops like ginger, Soya bean, kholer, maize, large cardamom, passion fruit and chilly. The state of Rajasthan has more than 6000 hectares under organic farming. States like Tamil Nadu, Kerala, Madhya Pradesh, Himachal Pradesh and Gujarat are promoting organic farming vigorously.

Farmers organizations such as Chetana have been established for marketing organic products. This programme was implemented in three states: Andhra Pradesh (Asifabad and Karimnagar), Maharashtra (Vidarbha, Akola and Yavatmal) and Tamil Nadu (Dindigul and Tuticorn). The programme was started in the year 2004 with 240 farmers and by the year 2007 more than 5500 farmers were participating in the program. A total of about 20,000acres and total raw cotton yield of 5000 tons was expected, which means about 1700 tons of lint. Food crop yield was 8000 metric tons, mainly pulses. The farmers have to face several problems while converting from conventional farming to organic. Lanting (2007) identified some of them as follows: premium price is not paid for these products because they are in the transition stage, storage facility is needed, with cash paid (preferably 70% of the crop value) for the stored products. Rural banking should be strengthened and loaning process should be made simpler. Hence the government could give a helping hand in the first three years of changing over to organic farming by providing preferred access to organic farmers. This could help reduce the drop out rate.

Sanghi (2007) argues that organic farming is an intensive process, mostly limited to resource rich farmers, and the export market and depends heavily on external support systems for price, market intelligence and certification of produce, among others. Hence he says that the

scope of coverage and social relevance of the organic farming is also limited. Instead he proposes ecological farming whose main objectives are maintenance of high productivity, reduction in production cost and enhancement in self reliance. It caters to both the resource poor and the resource rich; the process is simple, addresses local market and the scope of coverage and social relevance is also high. There are four main steps in ecological farming: the first being the adoption of non-chemical pest management methods; the second step is to focus on selling pesticide-free produce in the local market; the next step is to establish community managed seed banks; and finally the fourth step is to adopt non-chemical method of nutrient management. It has been argued that the ecological method is indigenous but is gradually disappearing due to constraints in labour availability. Sanghi sees a great scope for its revival by utilizing the incentives of labour under the National Rural Employment Guarantee (NREG) act.

Organic Agriculture in Andhra Pradesh

In A.P, in the early 1980's, the Permaculture Association of India popularized the concept of 'Permaculture' (permanent agriculture). Permaculture is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems. It is the harmonious integration of landscape and people providing their food, energy, shelter and other material and non-material needs in a sustainable way. The philosophy behind Permaculture is one of working with, rather than against, nature; of protracted and thoughtful observation rather than protracted and thoughtless action; of looking at the systems in all their functions, rather than asking only one yield of them; and of allowing systems to demonstrate their own evolutions (Mollison, 1990). The Deccan Development Society (DDS) an internationally well known NGO working with dalit women groups, has developed a farm on the principles of Permaculture in Zaheerabad region of deccan area. DDS encouraged sustainable agricultural practices in a big way and has been a pioneer in the country. More than 5000 women farmers in an area of more than 20,000 acres adopt sustainable agricultural practices, which are environment friendly, and are based on the traditional knowledge and are environment friendly. Similarly, the Centre for Sustainable Agriculture (CSA) based at Hyderabad, through several NGOs in the state, has promoted non-pesticidal management of pests in the state, where in the use of pesticides and chemical fertilizers is discouraged, while the use of local resources is encouraged.. The small success from few villages could be scaled up into more than 7 lakh acres in last three years in 1500 villages benefiting more than 3 lakh farmers. The Community Managed Sustainable Agriculture program is being implemented by the Society for Elimination of Rural Poverty,

the Government of Andhra Pradesh and the, Sustainable Agriculture Network of NGOs, with technical support from the Centre for Sustainable Agriculture. Today there are 50 villages which have become pesticide free and 7 villages which have become completely organic. The concept of non-pesticidal management of pests is being promoted among the farming community through the Indira Kranthi Pathakam of the Government of Andhra Pradesh. The Timbaktu Collective is another organization which has been promoting organic farming practices since a long time in Ananthapur district. Timbaktu Organic was initiated in 2005 by Timbaktu Collective in association with Adisakthi, Ananthasakthi and Mahilasakthi Mutually-aided Thrift Co-operative Societies (MATCS) promoted by the Collective, with financial support from Sir Dorabji Tata Trust, Mumbai. The goal of this venture is that the small and marginal farmers of the area improve their livelihood on a sustainable basis using organic farming.

The Government of Andhra Pradesh has initiated programmes related to organic farming through the Department of Agriculture and Horticulture. The Agriculture Department is proposing to take up promotion of organic farming in the state during the year 2008-09 by implementing several schemes with an outlay of Rs 18.29 crores. These schemes include organization of vermicompost units, establishment of vermi-hatchery units, distribution of green manure seed on subsidy, supply of bio-fertilizers on subsidy and certification of organic farming. The Andhra Pradesh state's policy on organic farming is yet to be finalized and the draft developed in this regard is being discussed at various levels.

Similarly the Horticulture Department of A.P is implementing the organic farming scheme under the State Horticulture Mission (SHM) from the financial year 2008-09. To get the certification, the organic farming scheme is proposed to be implemented in twelve districts of A.P. in the coming three years. These include Ranga Reddy, Medak, Mahbubnagar, Nalgonda, Warangal, Khammam, Kurnool, Kadapa, Guntur, Prakasam, Chittoor and Paderu ITDA and Vishakhapatnam. The organic farming scheme is being implemented in an area of 6567 hectares by selecting clusters of 50 hectares in compact blocks. The crops covered under the scheme include chillies, ginger, mangoes, cashew and vegetables. As per the SHM guidelines, the assistance per cluster is Rs.9 lakhs. Over a period of 3 years, all the farmers will be formed into groups, and trainings will be provided by experienced persons and personnel of the certification agency. The NGOs are actively participating in the scheme; they are responsible for obtaining certification by the accredited certification agency with whom the agreement is entered. All the NGOs except Pilupu (in Ranga Reddy district) have

entered into an agreement with M/s Vedic Organic Certification Agency. The SHM is providing an assistance of upto Rs15,000 per hectare over a period of 3 years. Rs.7000 is given in the initial year followed by Rs.4000 each in the second and third years to each farmer upto a maximum of 4.00 hectares per farmer. A technical support group member is allotted to one or two districts for monitoring the scheme periodically. The NGO shall identify the traders to market the organic produce at a higher price.

Acharya NG. Ranga Agricultural University is also conducting comparative research between organic farming and conventional farming since 2007 Rabi (last three crops) in all its research stations in the state. Each research station is conducting trials on the predominant crop grown in that area.

Chapter 3

ORGANIC FARMING: A REVIEW

Keeping the research objectives in mind, this review aims to span issues relating to the organic farming with an emphasis on comparing the conventional agriculture vis-a-vis organic agriculture. In India little research has been done on the socio-economic, ecological, cultural and livelihood dimensions of organic agriculture vis-à-vis conventional farming. Experiences are often drawn from global studies where off late considerable research has been done related to issues of soil fertility. In this chapter an attempt has been made to criticially review different views, which have a direct and indirect bearing on the study. The issues covered in the review include a) Yield During Conversion to Organic Farming b) Soil Fertility c) Importance of livestock d) Institution/Certification e) Ecological significance of organic farming vis-à-vis conventional farming f) Marketing and Policy support with respect to organic farming.

IV Can Organic Farming Feed the World?

A common question asked of the organic movement relates to its yield (Trewavas, 2004). Can organic agriculture feed the world? In answer to this question, one may ask, is conventional agriculture is successfully feeding the world? High input-high yielding systems are currently failing to feed the world, not because of problems with productivity, but because of problems with food distribution, social organization and serious concerns for poverty, racism and gender (Woodward, 1996). If land area is shifted from inorganic to organic farming, less food will be available due to yield losses during conversion. Such organically produced food goes to the rich who can afford to the buy it. As a consequence the food available to the poor decreases. The cost of food available to them increases. This gives rise to equity issues. Organic agriculture is productive and sustainable (Reganold et al, 1993; Drinkwater et al, 1998; Mader et al 2002; Murata and Goh 1997; Letourneau and Goldstein 2001). Some of the major issues involved in organic farming are discussed below.

Yield During Conversion to Organic Farming

Farmers convert to organic farming because of an the uneasiness experienced with the existing agriculture system, which is predominantly based on chemicals. A number of farmers perceive chemical agriculture as a health hazard to themselves. However, personal health is not the only reason to convert to organic. Farmers in Punjab, Haryana and Eastern Uttar Pradesh are able to keep their yields only through a drastic increase in chemical inputs. Yields in irrigated farms may go down during conversion period because these yields are boosted by artificial fertilizers and it takes time for the soil fertility to increase. However, after that yields will be equal if not higher than the yield during the conventional farming. In rainfed farming the situation is different; yields here are significantly lower and thus, the difference in yields between the conventional and conversion period is less. Though comparative yield studies are less both at global and national levels, we do find that certain studies give a broad indication of the productivity of organic farms vis-à-vis conventional farms. Conversion from a traditional low-external input system of cultivation rarely results in lower yields. However, when switching from external-input-intensive forms of agriculture, the yields may decline significantly, atleast during the initial years of conversion, until the natural soil tilth and fertility are sufficiently restored. But, after that, they may stabilize at a comparably, lower or even higher levels, depending on the efficacy of organic management and the quality of organic fertilizers applied (Kasturi, 2007). The wide range of organic fertilizers that are based on local resources and farmers knowledge (Butterworth et al., 2003) will take care of manorial needs of farmers. Organic farming can compete economically with conventional farming when particular attention is given to optimum approaches while conversion. Information needs of organic farmers should be surveyed and information delivery systems should be tailored to meet those needs (Cacek, 2009). In case of crops like rice, organic cultivation appears to be less economical as compared to other crops. However there is more scope for minimizing the economic cost and environmental loss, under organic farming system in the long run (Rajendran, 2002). Besides these, environmental balance is maintained such that crops, trees, animals and man can live more harmoniously. Reducing the use of pesticide can provide growers with direct economic benefits by decreasing the cost of inputs, there by increasing net returns (Brenner, 1991). It was reported by researcher Cacek (1984), that crop diversity in organic farms can have other economic benefits as diversity provides some protection from adverse price changes in a single commodity. Diversified farming also provides a better seasonal distribution of inputs (eg labour). However, organic farms require more intensive management than specialized conventional farms. Most, organic

farmers practitioners have reported that it was not the premium price of the organic produce but the reduced expenditure on inputs and similar yields to their neighboring conventional farmers that was attracting them (Alvares, 1996 and Sharma, 2005).

More recently, the experiments going on for 25 years in Switzerland (Maeder et al 2002) and USA (Pimentel et al., 2005) have reported sustainable yields(though marginally reduced in some years) without agrochemicals in temperate climatic conditions. On the other extreme, most agricultural scientists believe that without chemical fertilizers, the large quantities of Farm Yard Manure (FYM) and other biomass that will be needed to compensate for the fertilizers is unavailable. They also believe that different crops cannot produce high yield with out agrochemicals, fertilizers in particular and therefore, practicing organic farming means food insecurity for the country (Chhonkar, 2003).

Organic farmers need to borrow less money than conventional farmers for two reasons; firstly, organic farmers need to buy fewer inputs such as fertilizer and pesticides; and secondly, costs and income are more evenly distributed throughout the year on diversified organic farms. Organic farmers, however complain that they face discrimination (Cacek, 1984) by lenders, a possible economic disadavantage of organic farming. However, Blobaum (1983) concluded that this problem is more perceived than real.

Income and profitability of organic farms is equal or higher when compared to conventional and traditional farms (Van der and Dejager, 1992). In the long run, organic farming offers more advantages compared to conventional farming, because it not only promises higher yields but also ensures higher yield security and reduces dependence on external input, thus making poor households less crisis prone. These are weighty arguments, especially in marginal locations (Julia and et. al, 2008)

Lockeretz et. al (1978) compared the economic performance of 14 organic crop/livestock farms in the Midwest with that of 14 conventional farms. The farms under study were paired based on the physical characteristics and types of farm enterprises. The market value of crops produced per unit area was 11 percent lesser on the organic farms. But since the cost of production was also less, the net income per unit area was comparable for both systems. A study by Roberts et al (1979) compared data from 15 organic farms in the western corn belt with the USDA data on representative conventional farms in the same area. In most cases the net returns were greater on the organic farms. Both studies showed that production costs were longer on the organic farms.

Two studies comparing cash grain farms were conducted in the state of Washington. In the first study, Eberle and Holland (1979) compared three organic and three conventional farms and found that net incomes per unit area were 38 percent higher on the conventional farms. However, the author of a follow-up study of six organic farms found that net returns on these farms were 22 percent higher than on the representative conventional farms (Kraten, 1979). Berardi (1979) compared 10 organic and 10 conventional farms in New York and Pennsylvania for returns from wheat production only. When cash operating costs alone were included, the return were higher on the organic farms. However, when the costs of land and unpaid family labour were included the conventional farms had a higher average net return. However, the above studies had several limitations. The most obvious was the small sample sizes, which made it difficult to conduct any statistical tests of differences. The averages did not reflect the high variability that occurred in both yields and net returns on both types of farms. Pairing farms for the studies also caused problems, especially in the work by Eberle and Holland (1979) ; Berardi (1978). Finally, none of the studies included the livestock enterprise which may be essential for optimum economic performance of organic farms.

A 1984 survey of the members of the Regenerative Agriculture Association (Brusko et al, 1985) offered further information on the economic performance of organic methods compared to conventional methods. Of 213 respondents, 88 percent said their net income either stayed the same or increased when they began farming with fewer purchased inputs, while 12 percent said net income declined. The sample may not have been a representative sample of organic farmers, and many of the responses may have been based on perceptions rather than on well kept records. The survey seems to indicate a high level of satisfaction with the economic performance of low input farming.

Soil Fertility

We have had two decades of large-scale and rapid destruction of fertile agricultural soils in India as a result of the very processes which attempted to increase agricultural productivity (GOI, 2008a). The green revolution paradigm substituted the nutrients cycle with linear flows of purchase inputs of chemical fertilizers from factories and focused on the production of chemical marketable agricultural commodities. Yet, as the Punjab experience has shown, the fertility of soils cannot be reduced to NPK from factories, and agricultural productivity necessarily includes returning to the soil, part of the biological products that the soil yields. Technologies cannot substitute nature and work outside nature's ecological processes without

destroying the very basis of production nor can markets provide the only measure of ‘output’ and ‘yields’ (Shiva,1992).

The green revolution created the perception that soil fertility is produced in chemical factories, and agricultural yields are measured only through marketed commodities. Nitrogen fixing crops like pulses were displaced. Millets which have high yields from the perspective of returning organic matter to the soil were rejected as ‘marginal’ crops. Biological products not sold on the market but used as internal inputs for maintaining soil fertility were totally ignored in the cost-benefit equations of the green revolution miracle. They did not appear in the list of inputs because they were not purchased, and they did not appear as outputs because they were not sold (Shiva,1992).

FYM has always been one of the principal means of replenishing soil losses (Albert Howard, 2000). It supplies Soil Organic Matter (SOM) which is an indicator of life, soil health and even its production capacity. Plant biomass is the only ‘input‘ needed for enhancing SOM (Rupela, 2007). Organic manures not only supply nutrients to crops and improve the soil texture in drylands but also act as mulches. They also protect against adverse temperature effects, improve seed germination, increase the water retention capacity of the soil and create the right micro-climate for the development of beneficial soil microbes (Pradeep Sharma, 1991). Organically cultivated soils are relatively better attuned to withstand water stress and nutrient loss. Their potential to counter soil degradation is high and several experiments in arid areas reveal that organic farming may help combat desertification (Alam and Wani, 2003).

Farmers have treated soils as mother earth and revered her as their own mother. This spiritual and emotional understanding of soil and agriculture is not understood by most of the administrators and scientists, for whom soils are nothing but a tool for production. The vision of farmers makes it possible for them to harmonise their agriculture with ecological imperatives, while most of the agriculture policies end up being ecologically destructive (NBSAP, 2001).

In our modern agricultural system, we have forgotten how to feed the soil. We just feed the plants. If we feed the soil, it is necessary to only compensate for the elements that have been exported with the seed. This need can, to some extent, be fulfilled by growing plants like soya bean, which are nitrogen fixing. It is possible, in such a manner to develop an organic system with extremely low inputs of fertilizers in the soil (Alvares et al., 1999).

Butterworth et. al (2002) as per the study conducted in AP on the farmers' soil fertility management practices and how it helps for the livelihoods of the people, have found that farmers are usually rational decision makers, who weigh the costs of any practice against the potential benefits that are likely to be derived, attempting to make a net gain. The aspects like opportunity costs, risk and insecurity, likely future trends and long term versus short term gains were considered by farmers in assessing costs and benefits of adopting a Soil Fertility Management (SFM) practice.

what is 'unproductive' and 'waste' in the commercial context of the green revolution is now emerging as productive in the ecological context and as the only route to sustainable agriculture (Shiva, 1992). The solution to the crisis of dying soils cannot lie in the hands of those who created the problem-who look only at the market, not at the life of the soil. The healing and recovery of soils will not emerge by continuing to cling to the market as an organizing principle for agriculture. Recovery lies in rediscovering natural ways of renewing and learning, once again, to see that the soil has a right to a share of her produce in order to renew herself. Respecting that right is critical to satisfy our needs (Alvares et al., 1999)

Livestock

Livestock is an integral part of agriculture and has profound influence on sustainability. Apart from generating higher incomes, livestock generates employment and produces organic manure. The quantity and quality of livestock influences SFM both directly and indirectly. It contributes directly by influencing the availability of organic manure. It contributes indirectly through its influence on incomes of the households. Integration of livestock and crop production, or mixed farming, allows the use of animal manure to increase soil fertility. Farmers recognize the benefits of using manure, and with the relatively high costs of mineral fertilizers, manuring could play a greater role in maintaining soil fertility (Powell and Williams, 1995). The livestock component of the farming system is crucial to help maintain soil fertility, supply of draft power and food for the family (Reddy, 2001). The nutrient management system has rather become more closed with the weakened traditional linkages between forest and livestock (Turton et al., 1997).

Increased income through livestock increases the capacity of the household to invest on productivity enhancing methods through purchase of off-farm inputs (George, 1996).

Earnings from the land holdings of majority of marginal, small and semi-medium farms alone were not adequately sufficient for the household round the year and livestock rearing provided an alternative to the small farmers (Joshi and Jha, 1981).

Livestock economy is changing very rapidly in Andhra Pradesh. The growth of draught animal stock has slowed down compared to the milch animal stock which is growing relatively fast; and the proportion of cross breeds among milch animals is also growing rapidly (Conroy et al, 2001., Reddy, 2001 and Adolph and Butterworth, 2002). The reasons for this include reduction in farm size, increased mechanization, declining area of Common Property Resources (CPRs) lands and changing patterns in labour availability (Conroy et al, 2001). This has important implications for the availability of manure. Local animal breeds important for livelihoods and sustainable agriculture should be conserved *in situ* by strengthening integrated farming and indigenous systems of land use in which livestock plays a key role in nutrient cycles and the maintenance of soil fertility. Jurors of 'Prajateerpu' believed that the erosion of livestock biodiversity would increase with the corporate agriculture proposed under vision 2020 (Pimbert and Wakeford, 2002). They specifically called for appropriate training and research as well as for government support to re-introduce livestock. Declining fodder and water resources combined with blanket animal-breeding policies fuel a downward spiral of loss in livestock genetic diversity, draught power, natural fertilizers, livelihoods and household assets.

Agricultural productivity can be improved by better integrated crop and livestock systems, recycling crop residues, and the careful use of other available nutrients (Hilhorst and Muchena, 2000). Swaminathan (1990) opined that a farming system that aims to optimize the income and employment potential of the small farm through concurrent attention to crop and animal husbandry and post harvest technologies, needs to be more widely fostered. No major research programme in agriculture should be started without a fair understanding of the existing farming systems (Ruthenberg, 1980).

There is inadequacy of the draft (animal power, in particular) in rainfed ecosystems. We also need to identify critical and timely requirements of the draft in the production systems besides extended use of the available draft during the less critical periods. Thus, livestock production, being a self-income generating enterprise, reduces the irregularity and uncertainty in income from farm business (Anonymous, undated). Combination of agriculture with dairy and poultry farming fetches the small farmers more average net income than the other enterprises (Rao, 1992).

With the weakening of forest and livestock linkages, the nutrient management system has become closed. Also, the reduction in common property resource areas will reduce the availability of nutrients. It is very clear from the review that livestock is crucial not only to help maintain soil fertility, supply of draft power and food for the family but also to increase the agricultural productivity in dry lands.

Institution/Certification

The organizational structures supporting smallholder organic agriculture in India fall into four categories. These include farmers organized by a company, farmers operating under NGO initiatives, farmers organized or facilitated by government and farmers who have formed their own organizations like cooperatives, associations, self help groups, etc. Organic farming has been successful under a number of institutional arrangements and hence it is hardly possible to prescribe a particular framework for its further development (Kasturi, 2007). However, Santacolama (2007) argues that farmers in developing and transition countries still face institutional and economic constraints to reach the stage of being certified organic producers, making it particularly costly for small holders to participate in this market. In states like Chhattisgarh, unclear standards and tedious documentation process along with the lack of a single window certifying agency and expensive certification have so far not enthused the farmers. Added to this, the export volume of the state is fairly low and the farmers nor the consumers find it worthwhile to go for certification (Rao and Lakra,2005). Thus, a large segment of the organic community remains marginalized and is unable to get the premium on their produce. Some kind of support structure is needed, especially for the resource-poor small farmers to successfully venture in to organic farming. The main reason for this is the financial and other obstacles confronting farmers in the initial 'conversion' phase of a switchover from non-organic to organic farming.

Inorder to qualify for the "certified organic" label, a farm must not only conform to the stipulations laid down in organic standards, but also acquire a certificate from an independent certification body to establish the authenticity of its produce. The conversion period is basically the time between the start of organic management and the certification of crops or animals husbandry. It is the time taken to neutralize chemical residues, if any, left behind in the soil by practiced agricultural techniques. Unlike conventional agriculture where standardized chemical inputs are used, organic farm management does not depend on a uniform strategy. Instead, appropriate field management practices have to be developed and improvised depending on the particular case and nature of locally available inputs, because

organic farming aims at creating a closed system wherein most of the inputs are generated either from within the farm or from locally available resources, preferably renewable.

The standard duration of the conversion period for annual crops is 24 months, and for perennials it extends upto 36 months. However, the certification authority has the discretion of extending or reducing the duration of the conversion period depending upon the ecological conditions on the farm undergoing conversion. This often is contingent upon the agricultural technology followed during the pre-conversion phase. Since organic techniques are often more labour intensive, wage costs may increase. Costs may also arise from information and knowledge gathering and in acquiring certification and labeling from an established certification agency. The latter could be prohibitive for small farmers unless alternatives like small farmers' group certification and internal control systems for farmers exist (Kasturi, 2007).

There are three certifications schemes operating in developing and transition economies. The first is the third party certification for individuals, a well known and internationally recognized certification system. The second scheme is also third party certification in which small scale farmers may be certified in groups under an Internal Control System (ICS). The third scheme corresponds to participatory certification called the Participatory Guarantee System (PGS), which targets local or national markets and involves the participation of small farmers, small enterprises, traders and consumers in the certification process. PGS is an initiative largely coming from the developing world wherein the systems of quality assurance are directly managed and controlled by organic producers. PGS complements the organic movement as it is setup and managed by the very farmers and consumers that it serves. Importantly, there is no universal model for PGS. Each variant is adapted and specific to the individual communities, geographies, politics and markets of their origin.

Strong organizational support is a pre-requisite for further penetration of organic agriculture into India. The areas which warrant appropriate institutional support include a low-cost, hassle-free certification process and technical assistance for record keeping and an enabling scenario for small farmers, group certification, internal control system, etc., wherever necessary.

Ecology

Organic biodiverse farming and food production is the way out for the ecological and livelihood security of millions of small farmers in this country (Satheesh, 2008). Organic farming benefits the society substantially by reducing pollution and flooding conserving energy, soil nutrients, fish, wildlife and insuring the supply of food for future generations. However, virtually no credible data are available to policy makers on the magnitude of these benefits: they are unable to compare organic farming with other policy alternatives. In areas where organic farming is known to be economically feasible, policy barriers to conversion should be identified and evaluated. Organic farming is an attractive alternative for both farmers and policy makers (Cacek et al., 2009).

The new bio-chemical technology in agriculture, however, has many negative impacts on the environment. There has been significant increase in the use of chemicals like fertilizers and pesticides since the 1960s. There is enough cause for worry on the environmental consequences of these chemicals. Particularly, in the 1980's it was realized that for sustainable development, alternative farming practices are needed (Dev and Painuly, 1994). Pesticide usage has increased manifold, obviously due to many complex factors. Pesticide residues present in the environment affect the soil, water, agricultural products, animals and plants. Continuous usage of pesticides application has led to diseases like cancer and epilepsy with which the people are being made to suffer for years. Alternatives to pesticides are to be found viable in the long run and hence, a concerted effort needs to be put by all concerned for promoting SAD in the broader framework of environment and health (Rajendran, 2003). The economic and environmental impact of our farm policies on pesticide reduction also deserves scrutiny and policies that encourage adoption of ecologically sound farming practices need to be implemented (Brenner, 1991).

Although many trained farmers realize the importance of ecological agriculture, it was not always possible for them to put the training into practice, especially on their major farming land which provides them with most of their livelihood security (Datta and Kar, 2006). However, farmers have adopted this technique to a greater extent on their homestead land, which is less controlled by market forces and is free from other external factors. This perhaps reflects their belief in the need for such an approach. The above findings clearly indicate that the level of awareness among farmers is rising significantly, though there is still a long way to go before there is a total shift from inorganic to organic farming. Despite this fact, the

behavioural changes are very encouraging. It is mainly women who are bringing about this change. NGO training programmes encourage women to bring fallow homestead land under vegetable/fruit cultivation, which is now an alternative income source for the family. In most cases, women are solely responsible for collecting ingredients, preparing organic manure and applying it. While women are not involved in cropland management, they always encourage their husbands to use organic manure on their croplands.

It has been found that in places like Chhattisgarh where organic agriculture is popular, the farmers who try to practice organic agriculture suffer, as the upstream farmers may be using chemicals which permeate into the fields of the farmers practicing organic cultivation and the produce would be found contaminated during chemical analysis due to the residual effect between fields. This is more so in case of medicinal plants, where the sensitivity index is much higher owing to their use in the life saving drugs or health products. It has been found that the organic cultivation movement can become a success only when the farming communities are jointly sensitized and mobilized to give up inorganic practices (Rao and Lakra, 2005).

Field crops generally add phytotoxins or allelochemicals to the soils mainly through crop residues and partially through root exudates. Allelochemicals generally have a suppressive effects on germination/establishment of crops, often with a stimulatory effect. The deleterious effects of allello chemicals is more pronounced in monoculture due to accumulation in soil while the effect is very low in crop rotations (Acharya et al., 2001). It has been found that in places where the inorganic agriculture is been popular, the farmers who try to practice organic cultivation suffer, as the upstream farmers may be using chemicals which permeates into the fields of the farmers practicing organic cultivation (Rao and Lakra, 2005)..

The major factors that lead to growing interest in alternate forms of agriculture in the world are: increasing consciousness about conservation of environment, as well as health hazards associated with agrochemicals; and consumers' preference to safe and hazard free food. Organic agriculture is one among the broad spectrum of production methods that are supportive of the environment. The demand for organic food is steadily increasing both in the developed and developing countries at an annual average growth rate of 20-25% (Ramesh and et al., 2005). Considering the potential environmental benefits of organic production and its compatibility with integrated agricultural approaches to rural development, organic

agriculture may be considered as a development vehicle for developing countries such as India.

Comparative economics of crop production under Organic Farming System (OFS) and Inorganic Farming System (IFS) showed that production cost was gradually declining in OFS. Further, it is not easy to assign economic values for soil health, reduced pollution and improved resilience and reduced Green House Gas emissions (Venkateshwarlu, 2007). Changes in soil structure coupled with improved ground cover, decreased runoff by about 10 to 50 percent and increased infiltration by about 10 to 25 percent, all these factors combined to reduce soil erosion on organic fields by atleast two-fifths, and sometimes over four-fifths (Cacek, 1984). It is difficult to place a monetary value on the water lost as runoff and the nutrients contained in the eroded soil. In part, they are just displaced to other locations on the farm, where they remain available for crop production.

Marketing

The mechanism of organic marketing is quite different from that of regular marketing. Careful selection and development of large markets and distribution channels are of utmost importance. Such marketing not only requires additional costs but also specialized skills, know-how and experience all of which unorganized individual farmers are usually incapable of developing (Kasturi, 2007). About 85% of the total organic production in the country heads for the export market. The domestic market for organics is thus undeveloped in India. Lack of domestic marketing channels adds to the difficulties faced by farmers converting to organic methods in accessing export markets

Market access for small producers depends on a) understanding the markets b)organization of the firm or operations c) communication and transport links and d)an appropriate policy environment. In this changing scenario small farmers mainly need better access to capital and education. Management capacity, which is as important as physical capital, is the most difficult thing to provide. Further, collective action to deal with scale requirements needs to be designed in order to satisfy new product and process standards or to avoid exclusion from the supply chain. Collective action through cooperatives or associations is important not only to be able to buy and sell at a better price but also help small farmers adapt to new patterns and much greater levels of competition. Small farmers require professional training in marketing and in the technical aspects of production. There is also the need to strengthen

small farmer organizations and provide them with technical assistance to increase productivity for the cost-competitive market and to provide help in improving the quality of produce in order to capture value added in the supply chain (Sukhpal, 2006).

Policy Support

Policies have long focused on generating external solutions to farmers' needs. This has encouraged dependencies on external inputs, though they are more costly, environmentally damaging, and therefore, economically inefficient when compared to the resource-conserving options (Jules,1995). Reddy (1998) pointed out that the modern agriculture is like a cracked earthen pot, which cannot be put to good use any more. New policies must be able to create the conditions for development based more on locally available resources and local skills and knowledge. Policy makers will have to find ways of establishing dialogues and alliances with other actors the farmers' own analyses could be facilitated and their organized needs articulated. Dialogue and interaction would give rapid feed back, allowing policies to be adapted alternatively. Agricultural policies could then focus on enabling people and professionals to make the most of the available social and biological resources.

Despite the serious efforts of some NGOs, it appears that India is lagging far behind in the adoption of organic farming. So far the only achievement seems to be the laying down of the National Standards for Organic Production (NSOP) and the approval of a few accreditation agencies, whose expertise is limited to a few crops. For laying the spadework for the spread of organic agriculture in the country, certain issues require attention at the government policy making levels. These include a) substantial financial support by the governments which is absolutely necessary to promote organic farming; b) market development for the organic products which is a crucial factor to promote domestic sales; c) government support to the producer and consumer associations to market the organic products; d) the simplification of the process of certification; and e) a reduction in its cost. A vigorous campaign to highlight the benefits of organic farming against the conventional system is essential to increase the awareness of the farmers and consumers (Narayanan, 2005).

There is no mention of organic farming in the National Agricultural Policy. Organic farming offers an alternative method for production that can be suitably exploited to benefit some segment of farmers (Chand, 2003). However, certification of organic products becomes dubious if it is linked with high documentation, controlling, organizational and bureaucratic

effort (Julia et.al, 2008). In Chhattisgarh, through various initiatives, has been promoting the cultivation of medicinal, aromatic and dye plants apart from agricultural and horticultural produce. Being a herbal state, there is a lot of scope for promoting organic farming. The Chhattisgarh Vanoushadhi Board or the Medicinal Plants Board, the Department of Horticulture, Agriculture, and Chhattisgarh State Minor Forest Produce federation are some of the state government agencies promoting organic cultivation of agricultural, horticultural, medicinal and aromatic crops (Rao and Lakra, 2005).

Even in places where organic farming is facilitated without any direct government initiative, the state may still have some important roles to play for the following reasons; (1) NGOs may not always have the necessary business skills to succeed in marketing. In such situations, collaboration between NGOs and governments may be effective (2) Companies involved in contract farming arrangements with organic farmers need to be extremely effective and skilful at reaching organic markets. However, there may be a trade-off involved between the profit motives of the private companies and the best interests of the farmers. Hence, it is extremely important for the state to create an appropriate legal framework that enforces contracts and provides for trustworthy and effective arbitration in the best interests of the poor and unorganised farmers. (3) Formation of farmers' organizations has been found to be extremely beneficial for upholding the farmers' interests. However, it requires considerable support on a number of levels, including start-up costs, operational expenses, training and marketing. The state government or the NGO sector may assist in these respects. 4) Organic agriculture may also flourish under direct government involvement. While it has suffered downright neglect by the central government, a number of state governments have already made significant strides in organic farming. The governments of the mountainous states of Sikkim, Mizoram and Uttarakhand have undertaken significant initiatives to turn their states completely organic. State government initiatives in some form have also been taken in Karnataka, Madhya Pradesh, Arunachal Pradesh, Meghalaya, Punjab, etc. In the "Uttarakhand organic" initiative, a multi-pronged strategy - the organic model - been promoted not only as an agricultural technology, but also as an integral part of several rural development projects. Moreover, while export is not outside the purview of this initiative, significant emphasis has been placed on domestic market development as well. Although it is too early to comment on this programme, it seems that if implemented successfully, the project could become a role model for state driven organic development in India (Kasturi, 2007).

Conclusion

Based on the literature review it can be summed up that opinions about organic farming are divided especially among the experts. Disagreements about the profitability and yield increase in organic farming are acute, but there is a strong consensus on its eco-friendly nature and inherent ability to protect human health. There are strong views against organic farming mainly on the grounds of practicability of feeding a billion people, its financial and economic viability, availability of organic inputs and the know-how. However, many studies revealed that organic agriculture is productive and sustainable (Reganold et al., 1993; Drinkwater et al., 1998; Mader et al., 2002; Murata and Goh 1997; Letourneau and Goldstein, 2001). There are many people ;who, while approving organic agriculture, advocate a careful conversion of farms into organic, so that yield loss is taken care to the extent possible. Presently, there is a lack of government subsidies or support to make conversion to organic status easier or cheaper. The questions about the yield and financial viability of organic farming are crucial and there are no empirical studies available in the Indian context comparing the economic and ecological returns of organic farms vis-à-vis conventional farms. Keeping the research gaps in literature review this study on "Assessment of Economic and Ecological returns from millet based bio-diverse Organic farms vis-à-vis Conventional farms" was taken up in Anantapur district of Andhra Pradesh.

Chapter 4

SOCIO-ECONOMIC ASPECTS OF SAMPLE FARMERS

In this chapter an attempt is made to understand the socio-economic profile of the sample villages and sample farmers following organic and conventional agriculture. The demographic features of the sample villages and livelihood patterns seen in the selected villages are discussed in section-I. The socio-economic features, age group, literacy level, livestock population, market distance, farming experience, social participation, caste composition, land holding, net income and borrowings are some of the important issues discussed in the latter part of this chapter. This analysis is expected to provide information about the representativeness of the sample villages and help in getting insight into the organic farming practices of the sample farmers as against the practices of conventional farmers. Results of the soil sample analysis are also discussed in detail in this chapter.

I. Profile of the sample villages

The study is based on eight villages belonging to Roddam, Ramagiri and C.K.Palli mandals of Anantapur district of Andhra Pradesh**.** Venkatampally is the village with the maximum number of households (450) with a population of 2100, Beedanpalli is the village with minimum number of households (90) with a population of 540. Scheduled caste familes are seen all villages and only one Scheduled tribe family was seen in Rachur village. The study indicated that most of the organic farming sample farmers were in the age group of 35-44 (37.00%) years followed by 45-54years (31.00%). Where as majority of the conventional farmers were in the age group of 45-54years (36.00%) followed by 35-44 years (28.00%). In both conventional and organic agriculture 19.00 percent were in the age group of 25-34 years. The basic features of the villages such as land use pattern, social composition of sample villages are presented in tables 3.1. Agriculture, agricultural labour and animal husbandry are the main features of the sample villages.

Table 4.1 : Key Features of sample villages and Households

Features	Beedanpalli	C.K.Palli	Ganthimarri	P.Kondauram	Rachur	Shyapuram	Venkatampalli	Venkatapuram
No of Households(HHs)	90	110	250	170	179	154	450	170
Total Population	540	660	1552	839	856	616	2100	629
Scheduled Caste Population(per cent)	8.88	2.34	9.66	31.47	4.67	3.40	6.19	33.38
Social composition	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
Land value/acre in Rs 000's								
Irrigated	60,000	65,000	30000	30000	50000	50,000	80000	35,000
Dryland	30,000	70,000	25000	25000	35000	30,000	70000	65000
Livestock								
a)Large ruminants(LR)	270	78	158	340	130	95	650	330
b)Small ruminants(SR)	900	1230	3650	1300	6500	1300	10500	170
Crops Grown under Rainfed condition	Groundnut, Redgram,Maize, Cowpea	Groundnut, Redgram Cowpea,Jowar,Bajra, korra	Groundnut, Redgram,Greengram,Cowpea, Field bean,Bajra Maize,Korra.	Groundnut, redgram,korra,jonna	Groundnut, Redgram, Cowpea, Greengram, Horsegram, Korra, Sama, Bajra, Jowar, Gingelly	Redgram, Groundnut, Cowpea, Jowar,Bajra, korra	Groundnut, redgram,alasanda,greengram,maize,sajja	Groundnut, redgram, rice sunflower, jonna,
Crops grown under Irrigated conditions	Sunflower, maize,chillies,ragi,padd	Paddy, kusuma, maize,wh	Paddy,maize,kusuma,chil	Groundnut, paddy, sunflower,	Ragi, Maize, sunflower, chilli, malbari,	paddy,kusuma,chillies,wheat,	paddy,kusuma,chillies, wheat,maiz	Groundnut, redgram, korra,

	y	eat	lies	maize, cucumber	watermillon, groundnut, paddy	maize,tamato,brinjal	e,tamato,brinjal	jonna
Net Area Sown(percent)	64.51(1200 acres)	69.25 (856acres)	16.19(860acres)	47.46(2900acres)	84.21(2000acres)	60.71(425 acres)	90.90(5000)	71.42 (500)
No of Tractors	2	1	3	5	4	5	8	20
No of Tanks	2	1	1	8	2	4	1	2
No of Borewells	75	52	80	65	20	8	130	10
No of Self Help Groups(SHGs)	6	15	8	3	14	10	8	5
No of Rythu Mithra Groups(RMGs)	-	-	1	2	3	-	1	1
Electricity	Available	Available	Available	Avaialble	Available	Available	Available	Available
Distance to nearest market	60	0	0	10	50	30	0	2
Availability of animal shandy	No	No	No	No	No	No	No	No
Number of HHs migrating in 2008	3	1	5	4	7	2	30	5
Government Schemes implemented		Watersheds, EGS	EGS,NPT,CLDP	EGS,NPM,Indiramma Housing, Watershed, CLDP,Sericulture,RDT	IKP, RYS, IRDP,	NREGS, Watershed ,CLDP	EGS,NPM, CLDP,Watershed,PLANTATION	NPM, Watershed, EGS, RDT.

Source: Village records and Field survey

Dryland villages hosted higher crop diversity including traditional millet crops like *Korra, Jowar*, *Bajra*, and Sam*a*. Crop genetic diversity is an essential dimension of agricultural production in low-input farming systems, a reduction in diversity often leaves small cultivators more vulnerable (Cleveland et.al 1994). The soils of sample villages have been predominantly red sandy and sandy loams. The predominant source of irrigation in the sample villages has been only tube well irrigation.

The population of cows and bullocks is seen in good numbers in all the sample villages. The role of bullocks has been taken over by the tractors to a certain extent in Venkatampuram, venkatam palli,P.Kondapur and this has significant implications for the fertility of soils.

With uncertainty of rain and non-availability of irrigation facilities, few households of Venkatampalli(30HHs), Rachur(7HHs) and Venkatampuram(5HHs) migrate seasonally to distant places in search of employment.

Abnormal rainfall in study villages

In the study villages during the first year(2006-07)of organic farming project implementation there were delayed rains. Due to this the groundnut seed(that was meant for sowing) was sold and farmers have taken up alternate crops like Horsegram (Vulvalu), Jowar(Jonna) and sunflower (kusalu). During the Second year (2007-08) of the organic farming project the rainfall was normal and majority of the farmers harvested on an average a yield of 15-16bags/acre (43-45Kgs/bag). In the third year(2008-09) again the yield was less due to excess rain as a result of which flowering did not take place. Due to heavy rains the lack of proper drainage affected peg penetration and reduced the yield. On an average a very poor yield of 3-5bags/acre (43-45Kgs/bag) was reported by organic farmers. The situation was no different for the conventional farmers. The crop of pigeon also got affected due to excess moisture ("Kandi kooda *moddulu marinayi").* The crop of foxtail millet (Korra) was also affected partly due to rains and guvvalu(birds).

Socio-Economic Profile of The Sample Farmers

The description of the socio-economic background of the sample farmers helps us to assess the capabilities of sample farmers in adopting organic farming practices.

Social Composition

In order to understand the social and economic dynamics of sample villages, one has to look into the social system, which largely determines people's perceptions, values and knowledge. The size-class wise caste composition of sample households is presented in the table 4.2. It is evident from the table that the sample farmers were from all social groups. Post stratification of the sample households of organic farming revealed that majority (63 percent) belonged to backward classes followed by scheduled castes (31 per cent). Village wise analysis of data revealed that the population of Scheduled tribes was not found in any of the villages except one household in Rachur. In all the eight study villages across all the sizeclasses the percentage of Backward classes was high followed by scheduled castes in small and medium size-classes and Others (O.Cs) in the large size-class category. Even among the sample households adopting conventional agriculture, majority (69%) were backward class communities followed by others(15 percent) which mostly include O.Cs.

Table 4.2 : Distribution of sample households according to their Social composition(percent)

Social category	**Conventional Farming** (N=75)				**Organic Farming** (N=75)			
	Small	**Medium**	**Large**	**Total**	**Small**	**Medium**	**Large**	**Total**
Scheduled Caste	15.00 (5)	6.00 (1)	4.00 (1)	9.00 (7)	44.00 (20)	13.00 (3)	0.00 (0)	31.00 (23)
Scheduled Tribe	9.00 (3)	6.00 (1)	4.00 (1)	7.00 (5)	2.00 (1)	8.00 (2)	0.00 (0)	4.00 (3)
Backward Classes	64.00 (22)	82.00 (14)	67.00 (16)	69.00 (52)	53.00 (24)	75.00 (18)	83.00 (5)	63.00 (47)
Others	12.00 (4)	6.00 (1)	25.00 (6)	15.00 (11)	0.00 (0)	4.00 (1)	17.00 (1)	3.00 (2)
Total	100.00 (34)	100,00 (17)	100.00 (24)	100.00 (75)	100.00 (45)	100.00 (24)	100.00 (6)	100.00 (75)

Source: Based on primary survey

Notes: Figures in the parenthesis shows the percentage to the total sample households in that respective category.

Size-class

The size-class wise distribution revealed that majority were small farmers both in case of organic farming(60 percent) and conventional farming(45 percent). Among organic farming sample households only 8 per cent belonged to large farmers. Most of the organic farmers belonged to scheduled caste communities and were organized into groups to take up organic farming. Obviously the percentage of small farmers was high in this category.

Table 4.3: Size-class wise distribution of sample households (Percent).

Method of Farming	Category of Farmer			
	Small	**Medium**	**Large**	**Total**
Conventional Farming (N=75)	45.00 (34)	23.00 (17)	32.00 (24)	100.00 (75)
Organic Farming (N=75)	60.00 (45)	32.00 (24)	8.00 (6)	100.00 (75)

Source *:* Based on primary survey

Literacy

Education was operationalised as the number of years of formal schooling attended by the sample farmer. For the purpose of distribution of farmers six categories were evolved as not literate, classes I-V,VI-VII, VIII-X, Intermediate, Graduation and above. It is presumed that if a farmer is educated he can be made aware of organic farming methods and marketing issues involved so that he can take advantage of the situation. More importantly, it might be relatively easier to communicate the message by the extension agencies on recent advances in organic farming to a literate farmer. An attempt has been made to enquire into the educational background of the respondents. Analysis was done by calculating the percentage of farmers in various educational levels in the respective size class and also total sample households.

Among the total sample of conventional farmers 52.00 per cent were non-literate followed by informal education (15.00 percent) and I –V (13.00 percent). Among organic farmers too, the situation is same with majority(64.00 percent) non-literates followed by class I-V(16 per cent). The sample HHs above intermediate in conventional farming are 5 per cent and in organic farming it is 4 per cent. This could be due to lack of proper educational infrastructure in these villages. Another reason could be financial constraints and the need to work for the sustenance of

Table 4.4 : Distribution of Sample farmers according to their Literacy level

	Conventional Farming				Organic Farming			
	Small	**Medium**	**Large**	**Total**	**Small**	**Medium**	**Large**	**Total**
Illiterates	68.00 (23)	59.00 (10)	25.00 (6)	52.00 (39)	73.00 (33)	54.00 (13)	33.00 (2)	64.00 (48)
Informal Education	15.00 (5)	18.00 (3)	13.00 (3)	15.00 (11)	18.00 (8)	13.00 (3)	17.00 (1)	16.00 (12)
Class I-V	9.00 (3)	6.00 (1)	25.00 (6)	13.00 (10)	2.00 (1)	13.00 (3)	50.00 (3)	9.00 (7)
Class VI-VII	6.00 (2)	6.00 (1)	17.00 (4)	9.00 (7)	4.00 (2)	13.00 (3)	0.00 (0)	7.00 (5)
Class VIII-X	3.00 (1)	12.00 (2)	4.00 (1)	5.00 (4)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Inter	0.00 (0)	0. 00 (0)	17.00 (4)	5.00 (4)	0.00 (0)	8.00 (2)	0.00 (0)	3.00 (2)
Degree and Above	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	2.00 (1)	0.00 (0)	0.00 (0)	1.00 (1)
	34	17	24	75	45	24	6	75

Source*:* Based on primary survey

their families. Hence there is a need to strengthen the educational institutions at the village level so that farmers can have better access and capacity to make full use of the developments taking place with regards to organic agriculture management. As the majority of the respondents were not literates they were depending on their neighbours and peers for the useful knowledge and updated information related to organic farming.

Social participation

Social participation was operationalised as the degree of participation made by the respondents in formal organizations either as a member or an office bearer or a public leader. The sample farmers were categorised into those with no social participation, membership in one organization, membership in two organizations, membership in three and more organisations. Table 4.5 shows the distribution of respondents based on their social participation.

It can be observed from the above table that majority of the sample households belonging to conventional farming (60.00 per cent) had membership in two organizations followed by one

group(21.00 percent). Similarly 8.00 percent of the sample households had membership in more than three groups. In organic farming sample households majority (59.00 percent) had membership in three groups. Among size classes, in both organic and conventional farming small farmers had higher social participation followed by medium and large farmers. The reason was the membership in institutions like Self Help Groups (SHGs) and occupational related institutions. Among conventional farmers 4.00 percent had no membership in any group at all.

Table 4.5 : Distribution of Sample Households according to their Social participation

Membership in Groups	**Conventional Farming(N=75)**				**Organic Farming(N=75)**			
	Small	Medium	Large	Total	Small	Medium	Large	Total
No Membership	3.00 (1)	6.00 (1)	8.00 (2)	5.00 (4)	0.00 (0)	0.00 (0)	0.00 (0)	1.00 (1)
One Group	18.00 (6)	18.00 (3)	29.00 (7)	21.00 (16)	4.00 (2)	4.00 (1)	17.00 (1)	4.00 (3)
Two Groups	65.00 (22)	59.00 (10)	54.00 (13)	60.00 (45)	22.00 (10)	13.00 (3)	33.00 (2)	20.00 (15)
Three Groups	12.00 (4)	18.00 (3)	4.00 (1)	11.00 (8)	61.00 (28)	61.00 (14)	33.00 (2)	59.00 (44)
Four Groups	3.00 (1)	0.00 (0)	4.00 (1)	3.00 (2)	13.00 (6)	22.00 (5)	17.00 (1)	16.00 (12)
Total	(34)	(17)	(24)	(75)	(46)	(23)	(6)	(75)

Source: Based on primary survey

Note: Figures in parenthesis indicate percentage to total sample drawn in that particular size-class category.

Livestock

This is most crucial aspect influencing the soil fertility management practice of both conventional and organic farmers. Quantity and quality of livestock influences the soil fertility management both directly and indirectly. Higher the livestock number, more is the access to organic manures. The livestock component of the farming system is crucial to help maintain soil fertility, supply of draft power and food for the family (Reddy 2001).

It could be seen from table 4.6 that density of bullocks per unit land is less. Livestock population has reduced due to the fodder and drinking water shortages because of recurring drought

(Ranjitha, 2004). Especially, bullock population is coming down more with large farmers. The reasons are reduction in farm size, increased mechanization, declining area under Common lands and changing patterns in labour availability (Conroy, et. al, 2001). Another reason is that earlier children from SC and BC communities used to work for the land lords, who are now going to school due to awareness created by voluntary organizations and the emphasis given by government on primary education.

Table 4.6 : Size-class wise distribution of sample HHs according to their livestock (percent)

Livestock Category	**Conventional**				**Organic**			
	Small	Medium	Large	All	Small	Medium	Large	All
Bullocks(Oxen)	45.00 (18)	21.00 (6)	39.00 (19)	37.00 (43)	25.00 (12)	31.00 (11)	54.00 (6)	30.00 (29)
Bufalloes	12.00 (5)	17.00 (5)	12.00 (6)	13.00 (16)	12.00 (6)	8.00 (3)	0.00 (0)	9.60 (9)
Cows	20 .00 (8)	17.00 (5)	31.00 (15)	24.00 (28)	16.00 (8)	20.00 (7)	36.00 (4)	20.00 (19)
Sheep	7.00 (3)	10.00 (3)	8.00 (4)	8.00 (10)	4.00 (2)	5.00 (2)	0.00 (0)	4.00 (4)
Goat	5.00 (2)	14.00 (4)	0.00 (0)	5.00 (6)	6.00 (3)	14.00 (5)	0.00 (0)	8.00 (8)
Others	10.00 (4)	17.00 (5)	8.00 (4)	11.00 (13)	35.00 (17)	20.00 (7)	9.00 (1)	26.00 (25)
Grand Total	40	28	48	116	48	35	11	94

Source: Based on primary survey

Among the sample households of conventional farmers, majority (37.10 per cent) had bullocks followed by cows(24.10 percent),buffaloes(13.80 percent), others(11.2 percent) sheep(8.60 per cent) and goat (5.2 percent). In case of organic farming sample HHs majority(30.90 percent) were bullocks. However they were almost 9 per cent lesser than conventional farmers.

Farming Experience

It was operationalised as the number of years the sample farmer completed in farming at the time of investigation. The sample farmers were categorized into three groups of those having

experience of 1-15years, 16-30years, 31-45years and above. Table 4.7 reveals that majority(60.00 per cent) of the conventional farmers are in the age group of 16 and 30 years and majority organic farmers (71.00 per cent)were ranging between 16-30years. Among the total sample farmers of conventional farming 17.00 per cent had least farming experience and 17.00 per cent had highest farming experience of more than 31 years. Similarly among organic farmers 19.00 per cent had least farming experience and 11.00 percent had highest farming experience(11.00 per cent). Experienced farmers had rich knowledge of agricultural practices which are suitable to locally specific conditions and can do well under constraints (Adolph and Butterworth, 2002).

Table 4.7 : Distribution of sample households according to their farming experience (percent).

	Conventional Farming				**Organic Farming**			
	Small	Medium	Large	Total	Small	Medium	Large	Total
1-15 Years	26.00 (9)	29.00 (5)	13.00 (3)	23.00 (17)	16.00 (7)	27.00 (7)	0.00 (0)	19.00 (14)
16-30 Years	74.00 (25)	41.00 (7)	54.00 (13)	60.00 (45)	74.00 (32)	58.00 (15)	100.00 (6)	71.00 (53)
31-45 Years and above	0.00 (0)	29.00 (5)	33.00 (8)	17.00 (13)	9.00 (4)	15.00 (4)	0.00 (0)	11.00 (8)
Total	100.00 (34)	100.00 (17)	100.00 (24)	100.00 (75)	100.00 (43)	100.00 (26)	100.00 (6)	100.00 (75)

Source: Based on primary survey

They are actively managing soil fertility and other soil properties through a wide range of practices and significant inputs of time, knowledge and capital. However, dynamic soil fertility management practices which are based on farmers long experience are largely unknown and undocumented by the official research and extension system. Several indigenous SFM practices are still existing in the farming community (Acharya, et. al, 2001).

Livelihoods

Livelihood, in its simplest sense, is a means of gaining a living and comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance capabilities and assets, and provide sustainable livelihood opportunities for the next generation and which contribute net benefits to other livelihoods at the local and global levels and in the short and long term (Chambers and Conways, 1992). Ellis (2000) defines livelihood as that which comprises "…the assets (natural, physical, human, social and financial capital), the activities, and the access to these that together determine the living gained by the individual or household". This definition stresses the means rather than the ends.

Table 4.8 : Distribution of sample households according to their livelihoods (percent)

	Conventional Farming				**Organic Farming**			
	Small	Medium	Large	Total	Small	Medium	Large	Total
Agriculture	14.00 (5)	50.00 (8)	50.00 (12)	33.00 (25)	33.00 (15)	33.00 (8)	50.00 (3)	35.00 (26)
Agriculture + Draught animals	17.00 (6)	6.00 (1)	16.00 (4)	`14.00 (11)	9.00 (4)	17.00 (4)	34.00 (2)	14.00 (10)
Agriculture + Draught animals + Dairying	3.00 (1)	6.00 (1)	13.00 (3)	7.00 (5)	0.00 (0)	13.00 (3)	0.00 (0)	4.00 (3)
Agriculture + Agricultural Labour	63.00 (22)	38.00 (6)	21.00 (5)	44.00 (33)	58.00 (26)	37.00 (9)	17.00 (1)	48.00 (36)
Agriculture + Sheep/goat Rearing	3.00 (1)	0.00 (0)	0.00 (0)	1.00 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Total	100.00 (35)	100.00 (16)	100.00 (24)	100.00 (75)	100.00 (45)	100.00 (24)	100.00 (6)	100.00 (75)

Source: Based on primary survey

Agriculture, animal husbandry and allied activities generally constitute the livelihood activities of the farmers in the village. Agriculture +Agricultural labour was the main livelihood of both conventional farmers(44.00 per cent) and organic farmers (48.00 percent) followed by agriculture. Agriculture along with agriculture labour was the main livelihood for small farmers both in organic farming and conventional farming sample households. Even today farming and livestock rearing is one of the predominant livelihoods of the rural people (Reddy and Reddy, 2007).

Agro-Biodiversity

Farmers of dryland regions developed diversified cropping systems to ensure that the most essential natural resources such as sunlight, wind, rainfall and soil are optimally utilized through out the year. Crops that were developed over centuries were specifically bred to suit local soils, nutritional needs of people, livestock needs and climatic conditions. Large number of farmers, especially the women have been nurturing the agro-biodiversity and soil fertility with out any sort of support from the government. The lands of sample farmers of the study villages have hosted a wide range of crops (Table 4.9).

Table 4.9 : Predominant Crops grown by organic farmers in the study villages

Village	**Just Prior to Organic farming**	**After taking up organic farming**
Venkatampalli	Groundnut, redgram	Groundnut, Redgram, cow pea, field bean, Korra, sama, sajja, Jonna and Ragi
Chinnepalli	Groundnut crop, Redgram	G.Nut, Redgram, korra, sajja and jonna
Gantemarri	Groundnut, redgram, cowpea	Groundnut, Korra, sajja, cow pea, redgram and green gram
Shapuram	Groundnut, redgram, Cowpea	Groundnut, Redgram, Korra, Jowar, sajja, cow pea,
Beedanpalli	Groundnut , Redgram	Korra, Sajja, Jonna, Groundnut and Redgram.
Rachur	Groudnut, Redgram	Groundnut, Kandi, Korra, Sajja, Vulvalu..
Venkatapuram	Groundnut, Redgram	Groud nut, Kandi, Vulvalu,Alsandalu, Peasrlu,sajjalu,castor,Nuvvulu and Anumulu.
Kondapur	Ground nut, Kandi, Cowpea	Ground nut, Kandi, Korra, Sajja, Castor, Alasanda, Vulvalu, Pesarlu, Jowar, Samalu.

The table 4.10 shows the crop diversity was more in the fields of organic farmers as compared with conventional farmers. Majority(52.00 per cent) of the sample households adopting organic farming are growing atleast 5-6 crops type of crops in the lands owned by them. Forty four

percent grow 3-4crops in organic farms. In conventional farming majority (52.00 per cent) grow 3-4 crops. Only 1-2 crops are grown by 33 percent of the conventional farmers where as it is only 3 percent HHs in organic farming.

Table 4.10 : Percentage of total no of crops grown by sample households in their lands during the year 2008-09(Percent).

Number of crops	Conventional Farming	Organic Farming
1-2 Crops	33.00(25)	3.00 (2)
3-4 Crops	52.00 (39)	44.00 (33)
5-6 Crops	15.00 (11)	52.00 (39)
7-8 Crops	0.00(0)	1.00 (1)
9-10 Crops	0.00(0)	0.00(0)
Total	100.00 (75)	100.00 (75)

Source: Based on primary survey

Varietal diversity of 4-6 varieties were in the lands of majority (77.00 percent) organic farmers where as in case of conventional farmers majority (56.00 percent) had varietal diversity ranging between 1-3. Only 7.00 percent of the organic farmers and 5.00 percent of the conventional farmers had varietal diversity of seven and above.

Table 4.11 . Varietal Diversity adopted by sample households in their lands during the year 2008-09(in one hectare).

Varietal Diversity	Conventional Farming	Organic Farming
1-3 Varieties	56.00 (42)	16.00 (12)
4-6 Varieties	39.00 (29)	77.00 (58)
7 and above	5.00 (4)	7.00 (5)
Total	100.00 (75)	100.00 (75)

Source: Based on primary survey

In conventional farming majority (76.1 percent) land was under drylands where as in the case of organic farmers 70.00 percent of the land constituted drylands. Irrigated land was high (16.1 percent) with conventional farmers where as current (8.3 percent) and permanent fallows (9.8 percent) were high in organic farming.

Table 4.12 : Land use details of sample households (Percent)

Land use	**Conventional farming**				**Organic farming**			
	Small	Medium	Large	All	Small	Medium	Large	All
Irrigated Land	2.90 (1.0)	11.60 (9.5)	18.30 (65.3)	16.10 (75.8)	12.50 (7.9)	13.00 (15.0)	4.10 (5.0)	11.90 (27.9)
Dry Land	91.20 (31.07)	83.80 (68.95)	72.60 (258.11)	76.10 (358.13)	74.00 (46.94)	74.00 (85.2)	76.80 (93)	70.00 (164.64)
Grazing Land	8.60 (2.9)	1.50 (1.2)	0.10 (0.3)	0.00 (0.2)	2.50 (1.6)	0.80 (0.9)	0.70 (0.8)	0.20 (0.4)
Current Fallows	0.00 (0)	0.00 (0)	2.50 (9)	1.90 (9)	3.90 (2.5)	9.50 (10.9)	5.00 (6)	8.30 (19.4)
Permanent Fallow	5.90 (2)	3.00 (2.5)	6.50 (23)	5.80 (27.5)	6.50 (4.1)	2.60 (3)	13.20 (16)	9.80 (23.1)
Total	100.00 (36.97)	100.00 (82.15)	100.00 (355.71)	100.00 (470.63)	100.00 (63.04)	100.00 (115.00)	100.00 (120.8)	100.00 235.44)

The land ownership was mostly with men. In the case of conventional farmers 70.7 percent of the households, men had land ownership and in organic farming sample HHs it is 74.7 percent. Land ownership for women was seen mostly in case of small farmers(17.8 percent) in organic farming sample HHs where as it was seen in both small(20.0 percent) and medium(23.5 percent). In case of 14.7 percent of sample HHs of organic farmers there was joint ownership where as it was 13.3 percent in case of conventional farmers.

Table4.13 : Land ownership of the sample households(percent)

	Conventional				**Organic**			
	Small	Medium	Large	All	Small	Medium	Large	All
Owned by Men	74.30 (26)	70.60 (12)	65.20 (15)	70.70 (53)	75.60 (34)	79.20 (19)	50.00 (3)	74.70 (56)
Owned by Women	20.00 (7)	23.50 (4)	4.30 (1)	16.00 (12)	17.80 (8)	0.00 (0)	0.00 (0)	10.70 (8)
Owned by Both	5.70 (2)	5.90 (1)	30.40 (7)	13.30 (10)	6.70 (3)	20.80 (5)	50.00 (3)	14.70 (11)

Soil type

The soils of the study area varied from deep black cotton soils to light sandy soils. The kind and depth of soils also influenced the soil fertility. Generally, it is seen that soils with greater depth will be more fertile than shallow soils. It is evident from table 4.14 that majority (63.2 percent) of the soils owned by conventional farmers are red soils (yerra nela) followed by 18.9 percent red sandy soils (thella nela). Among organic farmers 57.6 percent had yerra nela followed by 35.9 percent thella nela. Black soil was more with conventional farmers(10.4 percent) as compared to organic farmers (3.3percent). There were small proportions of saline soils among conventional farmers (4.7 percent) and organic farmers (2.2 per cent).

Table 4.14: **Size-class wise distribution of sample Households according to their soil (percent)**

	Conventional N=106 plots				**Organic N= 92 Plots**			
Type of soil	Small	Medium	Large	All	Small	Medium	Large	All
Red soil (*Yerra Nela*)	85.30 (29)	54.20 (13)	53.20 (25)	63.20 (67)	60.00 (30)	55.20 (16)	53.80 (7)	57.60 (53)
Red Sandy soils(*Thella Nela*)	11.80 (4)	29.20 (7)	19.10 (9)	18.90 (20)	32.00 (16)	44.80 (13)	30.80 (4)	35.90 (33)
Sandy soil(*Isuka*)	2.90 (1)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Black soil(*Nallaregadi*)	0.00 (0)	4.20 (1)	21.30 (10)	10.40 (11)	6.00 (3)	0.00 (0)	0.00 (0)	3.30 (3)
Saline soils(*Chowdu*)	0.00 (0)	8.30 (2)	6.40 (3)	4.70 (5)	0.00 (0)	0.00 (0)	15.40 (2)	2.20 (2)
Soils with Seepage(*Jowyku*)	2.90 (1)	0.00 (0)	0.00 (0)	0.90 (1)	2.00 (1)	0.00 (0)	0.00 (0)	1.10 (1)
Any Other	0.00 (0)	8.30 (2)	0.00 (0)	1.90 (2)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Grand Total	34	24	47	106	50	29	13	92

Cropping System

Farmers of drylands have developed diversified cropping systems to ensure that the most essential natural elements such as sunlight, wind, rainfall and soil are optimally utilized through out the year. Crops that were developed over centuries were specifically bred to suit the changes in rainfall pattern from year to year. The short and long duration varieties, water tolerant and

drought resistant varieties, etc., that were developed were the result of this careful planning over centuries by farming communities. Inter cropping, mixed cropping, relay cropping and multi-tiered cropping were the strategies adopted by the sample farmers and were highly relevant. By doing so the farmers have balanced food and cash crops, along with the fodder needs of their animals and simultaneously managed the fertility of their marginal soils.

Table4.15: Cropping system adoption by sample households(percent).

	Conventional N=106 plots				**Organic N= 92 Plots**			
Cropping system	Small	Medium	Large	All	Small	Medium	Large	All
Dry sown Paddy	0.00 (0)	0.00 (0)	20.80 (10)	9.40 (10)	4.00 (2)	0.00 (0)	23.10 (3)	5.40 (5)
Groundnut	8.80 (3)	8.30 (2)	10.40 (5)	9.40 (10)	2.00 (1)	0.00 (0)	0.00 (0)	1.10 (1)
Groundnut +Redgram	64.70 (22)	25.00 (6)	27.10 (13)	38.70 (41)	16.00 (8)	10.30 (3)	30.80 (4)	16.30 (15)
Ground nut + Red Gram + Cowpea + broder crop of jowar/Bajra.	11.80 (4)	4.20 (1)	16.70 (8)	12.30 (13)	52.00 (26)	51.70 (15)	7.70 (1)	45.70 (42)
Groundnut+Redgram with strip cropping of Korra	0.00 (0)	4.20 (1)	0.00 (0)	0.90 (1)	0. 00 (0)	0.00 (0)	0. 00 (0)	0. 00 (0)
Ground Nut+Bajra	0.00 (0)	4.20 (1)	0.00 (0)	0.90 (1)	2.00 (1)	6.90 (2)	7.70 (1)	4.30 (4)
Redgram+Greengram	0.00 (0)	4.20 (1)	2.10 (1)	1.90 (2)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Greengram	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	3.40 (1)	0.00 (0)	1.10 (1)
Jowar	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	2.00 (1)	0.00 (0)	0.00 (0)	1.10 (1)
Others	14.70 (5)	50.00 (12)	22.90 (11)	26.40 (28)	22.00 (11)	27.60 (8)	30.80 (4)	25.00 (23)
Grand Total	34	24	48	106	50	29	13	92

Despite the constant encouragement for monocropping by the agricultural extension agencies and private seed, pesticide and fertilizer companies from past three decades, farmers still follow inter cropping and mixed cropping realizing its merit (Table 4.15). . The adoption of this practice needs seeds of required quantities of diverse crops that are grown in the field. Just like crop

rotation, this too has been a significant practice from the farmers' perspective in maintaining soil fertility management and managing crop pest.

In conventional farming, among all size classes 40.6 percent was mixed cropping followed by monocropping (29.24 percent) and intercropping. Among sample households of organic farming 67.4 per cent are following mixed cropping followed by monocropping (12.00 percent) and intercropping (6.5 percent). Farmers value such diversity since it provides greater protection against the risk of crop failure (Scoones, 2001). The reasons given by farmers for the crop diversity include the access to diverse and nutritive food to the family members, availability of different kinds of fodder and feed to the livestock, improves the soil fertility, results in effective utilization of farmland and to make sure that under no conditions of unfavorable environment and climate, the whole crop is lost.

Table4.16: Size-class wise distribution of sample farmers' plots according to cropping system in Kharif 2008-09(Percent).

	Conventional N=106 plots				**Organic N= 92 Plots**			
Cropping method	Small	Medium	Large	All	Small	Medium	Large	All
Monocropping	11.70 (4)	29.20 (7)	42.50 (20)	29.24 (31)	8.00 (4)	6.90 (2)	38.50 (5)	12.00 (11)
Inter Cropping	44.10 (15)	25.00 (6)	14.90 (7)	26.40 (28)	8.00 (4)	3.40 (1)	7.70 (1)	6.50 (6)
Mixed Cropping	38.20 (13)	41.70 (10)	42.60 (20)	40.60 (43)	60.00 (30)	86.20 (25)	53.80 (7)	67.40 (62)
Strip Cropping	5.90 (2)	4.20 (1)	2.10 (1)	3.80 (4)	24.00 (12)	6.90 (2)	0.00 (0)	15.20 (14)
Grand Total	34	24	47	106	50	29	13	92

By practising inter/mixed cropping, farmers combine crops with varying length of root depth, therefore avoiding competition for space, moisture and nutrients. In mixed cropping systems, root diversity at different levels below the ground physically stabilises soil structure against erosion and soil movement on steep slopes, and in tropical systems, the contribution of roots to soil organic matter is proportionately larger than from above ground inputs. The effects of roots on soil biophysical properties are particularly critical in farming systems where crop residues are at a premium for fuel and fodder. Earthworms, other soil fauna and microorganisms, together

with roots of plants and trees, ensure nutrient cycling; pests and diseases are kept in check by predators and disease control organisms, as well as by genetic resistances in crop plants themselves; and insect pollinators contribute to the cross-fertilisation of out crossing crop plants.

The natural process of biological nitrogen fixation by roots constitutes an important source of nitrogen for crop growth. It therefore provides a major alternative to the use of commercial nitrogen fertiliser in agriculture. Intercropping/mixed cropping will safeguard against total failure of the crops during unfavorable climatic conditions and can increase production and income on drylands (Singh 1979).

In monocropping system the incidence of pest or spread of disease is easy as there is single crop. Where as the inter/mixed cropping system itself acts like a barrier to the establishment of pests and there by reducing the damage. More over it becomes difficult for the pest to locate its food in the mixed cropping system. Interestingly some of the crops in the mixed cropping system, simultaneously will be source of food for natural enemies of crop pest. So the more the variety of crops in a field, high is the population of beneficial organisms which takes care of pest. This helps in avoiding use of any pesticide.

Crop rotation (*Panta Marpidi*)

Crop rotation is another tried and tested practice. The growing of different crops on a piece of land in a pre-planned succession is called crop rotation Crop rotation is popularly known as *panta marpidi* by farmers of Andhra Pradesh. Crop rotation ensures that the same soil nutrients are not used up by the crop every season. Crops, which use different nutrients, are grown alternatively to keep the nutrient balance in the plots. Farmers attach high value to this practice indicating the significant contribution of this practice to soil fertility maintenance since ages. Crop rotation itself does not involve any cost but involves the decision to change the crop every season in a particular plot.

Table 4.17 : Crop rotation in the sampled plots(Percent)

	Conventional N=106 plots				Organic N= 92 Plots			
Crop Changes	Small	Medium	Large	All	Small	Medium	Large	All
Crop Rotation Followed	8.80 (3)	16.70 (4)	42.60 (20)	22.60 (24)	56.00 (28)	55.20 (16)	38.50 (5)	53.30 (49)
No Crop rotation followed	91.20 (31)	83.30 (20)	59.60 (28)	65.10 (69)	46.00 (23)	44.80 (13)	61.50 (8)	46.70 (43)
Grand Total	34	24	47	106	50	29	13	92

The decision of rotating the crops has a huge bearing on soil fertility management and hence it is being discussed in detail. Farmers expressed that if we grow the same crop continuously on the same patch of land we don't get good yields. They have been advised by their elders that crops have to be rotated for the fertility of soils. Thus farmers not only grow crops but also take care of soil and its fertility. Compared with monoculture cropping practices, multicrop rotations with two or three crops in a year can result in increased soil organic carbon content (Purakayastha and et al, 2008). This is because of addition of large amount of above ground as well as underground biomass in the soil. Such crop planning is practiced in dryland regions. The complexity and diversity of such micro-environments created by farmers are often undervalued (Chambers, 1995). Table 4.17 clearly reveals that crop rotation was more(95.3 percent)in organic farming as compared with conventional farming where in only 22.6 percent of the total sampled plots the crop rotation was followed.

Soil sample analysis

The focused group discussions with organic farmers in study villages revealed that the fertility of their soils has improved. They came up with several indicators to support their statements which are discussed in the subsequent chapter. So keeping these things in view a soil sample analysis was taken up to assess the impact of organic manures on soil fertility after shifting from conventional farming to organic farming. Two soil samples each were selected randomly from organic and conventional agriculture from the 8 study villages. Soil samples were taken from the 0-30 cm depth. Soil test data from 16 organic plots and 16 conventional agriculture fields which are 3 to 5 acres in size, was Analyzed for changes over time in soil chemical properties, like organic carbon, and available soil nitrogen as these two generally considered as the index of soil

fertility. The soil samples were analysed at Regional Agriculture Research Station, Warangal of Acharya N.G.Ranga Agricultural University under the guidance of Senior Soil Scientist Dr. R.Uma Reddy. The results of soil sample analysis are presented in the following table.

Table 4.18: Details of Organic carbon content and Available Soil Nitrogen in sampled plots.

S.No of Farmer	**Organic Farming**		**S.No of Farmer**	**Conventional Farming**	
	Organic Carbon(%)	Available Soil Nitrogen		Organic Carbon(%)	Available Soil Nitrogen
F1	0.81	301.06	**F1**	0.63	401.41
F2	0.80	302.11	**F2**	0.63	388.86
F3	0.80	301.41	**F3**	0.62	338.69
F4	0.76	275.97	**F4**	0.56	338.69
F5	0.76	275.97	**F5**	0.55	331.42
F6	0.74	275.97	**F6**	0.52	327.47
F7	0.74	250.88	**F7**	0.51	302.79
F8	0.73	210.88	**F8**	0.49	235.87
F9	0.72	205.79	**F9**	0.45	234.70
F10	0.68	195.62	**F10**	0.43	225.79
F11	0.63	188.16	**F11**	0.43	213.25
F12	0.63	178.16	**F12**	0.36	200.70
F13	0.62	163.07	**F13**	0.27	188.16
F14	0.60	163.07	**F14**	0.24	188.16
F15	0.58	151.53	**F15**	0.24	188.16
F16	0.40	150.23	**F16**	0.16	175.62
F17	0.26	150.03	**F17**	0.16	175.62

Organic manuring practices adopted by the organic farmers has led to the gradual improvement in soil fertility parameters such organic carbon content and available soil nitrogen. In can be seen from table 4.18 that organic carbon of conventional farming plots was ranging from 0.16 to 0.63 % where as in organic farming plots, the same rose was ranging between 0.26 to 0.81. This can be attributed to the application of organic manure for the past three years since their shift to organic farming. Similarly, the available soil nitrogen was more incase of organic farming plots ranging between 175.62- 401.41(Kg/ha). Where as this was lesser in conventional farming plots ranging between 150.03 - 301.06(Kg/ha).

Because of large amount of completely decomposed organic manures (low C: N ratio) added to the soil continuously for two to three years (In Anathapur single crop a year) organic carbon content of soil is increasing, because of which population of micro flora is also increasing as Organic manures provide a readily available source of carbon for the soil micro organisms particularly heterotrophs. The most important reactions which the micro-organisms carry out are decomposition of organic matter, synthesis of humic substances in soil, transformation of nutrients and nutrient recycling in soil. The organic manures (residues), which undergo breakdown and transformation, are complex in nature, containing carbohydrates, proteins and other nitrogenous compounds lignins, fats, etc. in course of the microbial reactions; the soil is enriched with the dead tissues of organisms forming part of its organic matter. The whole process of decomposition of organic matter, mainly of plant origins, is due to the microbes.

Addition of organic manures helps in enriching the soil with available soil nutrients. Organic farming conserves soil fertility as it rely upon large scale application of animal wastes, FYM, compost,croprotation, crop residues, green manures vermi compost, bio fertilizers. All these things lie in harmony with nature and also improving the structural status of soil, for good soil compactness (Soil compaction is the process of increasing dry bulk density of soil. In fact it is not desirable, but in coarse textured soils, for reducing hydraulic conductivity of soil, for enhancing moisture conservation in soil, for better seed germination, it is desirable),for ideal Bulk density , pore space and lessens the crust formation (In addition to high exchangeable sodium percentage low organic matter content of soil also responsible for crust formation which a serious barrier for seedling emergence in Ananthapur soil) of the soil, but the degree of

improvement depends upon the quantity and length of application of manure, the climatic conditions, and nature of soil. application of organic manures will also Lower Input Costs, enables the plant to show drought resistance. Organic farming is one of the important ways of maintaining soil health.

Per acre Expenditure and income

An attempt is made to arrive at the per acre average income of total sample HHs in the year 2008-09. This was calculated by subtracting cost of crop production from gross income of agricultural produce.

Table 4.19 : Average Per acre expenditure(in Rs) of sample Households during the year 2008-09

S.No	Item of expenditure	Conventional agriculture	Organic agriculture
1.	Seed Quantity	2071	1989
2.	Organic fertilization value	374	619
3	Chemical fertilizer	328	0.0
4	Pesticide/Bio-pesticide	629	26
5	Human Labour	1603	1669
6	Bullock Labour	877	707
7	Machine Labour	259	112
	Total	6141	5122

The average per acre agricultural expenditure of sample households of conventional agriculture is Rs6141 and for organic agriculture is Rs5122. It could be clearly seen that there was a significant decrease in the expenses related to pesticide use and chemical fertilizers. The expenses on bullock labour were slightly lesser in organic farming. This could be due to the slightly lesser usage of bullocks due to lesser livestock populations (especially cows and

bullocks) with organic farmers. The same was revealed by the farmers in the focused group discussions. The expenses on seed were nearly same in both types of farming.

Table 4.20: Average Per acre income(in Rs) of sample Households during the year 2008-09

S.No	Item of expenditure	Conventional agriculture	Organic agriculture
1.	Grain yield value in Rs	1585	1219
2.	Fodder yield /Stacks/bundles value in rupees	361	382
3	Crop By-products value in Rs	75	132
4	Uncultivated foods value in Rs	51	191
	Total	2072	1924

The table reveals that the per acre income is quite less in both organic farming and conventional farming. The income is almost one third of the expenditure incurred pee acre. This is mainly due to poor yields due to excess rain. The average yields of both organic and conventional farms was ranging between 135-225 Kgs. It could be seen that the grain yield was less in the case of organic agriculture as compared with conventional agriculture. Similarly the per acre income of sample households of organic agriculture was Rs 1924 and is lesser by Rs 148 than conventional agriculture. But it was revealed in FGDs that in the year 2007-08 the average yield of sample households was ranging between 450 - 675 Kgs. It was clearly reported by farmers that though the yields were slightly lesser in organic farms, the input cost were much lesser in organic farms as compared with conventional agriculture. Three years experience of organic farmers revealed that despite slightly lesser yields in organic farms the per acre net income was equal or more than conventional agriculture due to lesser input costs. This means that organic agriculture was economically viable as compared with conventional agriculture. But it is difficult to conclude this with the empirical data obtained in the research period (2008-09). However a series of focused group discussions with several organic farmers in 8 study villages clearly brings out the fact that despite a yield reduction of 15-25% in the initial years of shifting to organic farming, the lesser input costs in organic farming makes it economically profitable than the conventional

agriculture. Some farmers reported during FGDs that the yield in organic farms even in the initial years of shifting from conventional agriculture was no less. It was interesting to notice that the inputs costs incurred for pest management and fertility enhancement are considerably reduced for organic farmers. Though the grain yield was less for organic farmers, the income from fodder, crop by-products and uncultivated foods was higher than conventional agriculture. This could be due to the wider adoption of inter/mixed cropping systems by the organic farmers which resulted in higher availability of fodder, crop by-products and uncultivated foods.

5 th Chapter

Organic farming : Farmer's Perceptions

The present study in addition to the quantitative data through household interviews also tried to understand the farmers' perception, especially the women regarding the various aspects related to the organic farming. These include reasons for shift to organic farming, Yield reduction during Conversion, Improved health due to organic farming**,** Importance of Livestock for organic farming, Food habits of the Organic farming families, access to uncultivated foods/weeds in organic farms, advantages of marketing by Dharani cooperative and marketing issues involved and advantages of organic farming. In addition to these things farmers clearly brought out the impact of organic farming on soil, human beings and livestock. In this chapter we also discuss about whether the farmers will continue organic farming after the with drawl of support from TIMBAKTU project and the visible impact of organic farming on other farmers in the village. Finally a few important suggestions given by the farmers for easy spread of of organic farming is also discussed in this chapter.

Activities supported by TIMBAKTU

The farmers who have taken up organic farming were supported by TIMBAKTU NGO by way of providing various inputs. These initiatives helped the farmers to reduce their inputs costs and also obtain the sustained yields. Major support extended to the farmers by TIMBAKTU is as follows.

1. Support for Collection of cow urine(Ganju): Farmers were provided big wide flooring stones to lay in the cattle shed so that the urine passed by the animal does not get sinked in to the soil of cattle shed. A small pot like vessel (thottilu) is fixed in the ground in one corner, wherein the urine is collected through gravity. This urine forms the important input for the preparation of jeevamrutham, an organic fertilizer.
2. Provided the sprayer.
3. Support for taking up Soil and moisture Conservation works.
4. Supply of neem oil.
5. Provision of Neem cake.
6. Provided the seeds of korra, alsandalu, jowar and castor.
7. Financial support for crop harvesting.
8. Support for the marketing of organic produce.
9. Trainings through Farmers' Field School.

ORGANIC FARMING PRACTICES

Since organic farming warrants the cultivation in the absence of agro-chemicals. It involves a careful selection of components of farming system keeping the local resources, agro-climatic features and socio-economic structure. The following organic practices are being followed by the organic farmers for cultivation of their crops.

1)Varietal diversity :

Varieties which are hardy and capable of doing well withstanding pest and diseases are preferred. Local varieties have found a prominent place along with the introduced varieties which were performing well in farmer's condition. The following table gives the information related to the varietal adoption and diversity in each crop.

Table 5.1: Details of varieties adopted in crops grown by the sample farmers.

Crop	Variety used
Ground nut	Small bunchy type(Chinna Gutti), TMV1, TMV2, JL-24 and Local Ground nut.
Redgram	Local and LRG 30.
Korra	Local and Sri Krishna Devaraya
Jowar	Local and High yielding Varieties
Bajra	Local and Raavi
Cow pea	Local
Horse gram	Local
Sesame	Local
Castor	Local
Green gram	Local

2) Seed Treatment

Organic farmers were following different seed treatment methods and some of them are discussed here. Prior to shifting to organic farming, farmers adopted seed treatment with Dithane M-45 which costed Rs75/acre. Where as now seed treatment costs Rs 50 or less than that. Now a mixture of Neem oil(250ml)+ Ash(500gms)+ Asafoetida(20gms)is used**.** Farmers revealed during focused group discussions, that because of asafoetida smell the problem of wild pigs was

controlled to an extent. The smell of this acted as a repellent. In Kondapur village seed treatment was done using a mixture of Cow Urine**+** Neem oil + Ash**.** This helps to control the root grub(veru purugu).

3)Manuring

To achieve economical production, fertility of the soil has to be maintained and gradually improved. Improvement and maintenance of organic matter of the soil is important, as this would increase the physical parameters of soil, improve soil structure and enhance nutrient supply. Since huge amounts of farm yard manure to meet the nutrient requirement of the crops is not available, a combination of sources with different biological properties are being used. These include Jeevamrutham, Tank silt, Sheep manure, Sheep penning, Neem cake, Biofertilisers, Green leaf manuring, Green manuring, Panchagavya and Vermicompost

a)Farm Yard Manure

A wide range of organic inputs are being utilised by farmers and farm yard manure is the major fertility enhancing input. It has been the been the principal means of replenishing soil losses since ages(Butterworth et al, 2003). Typically organic inputs require transport as well as labour intensive processing to provide nutrients in the right quantities and form. Importantly, these materials are valued by farmers for other properties than just providing nutrients. This includes the ability of soils to hold and provide water and nutrients for crops.

Farm yard Manure is usually a combination of manure and various wastes and crop residues. It is derived from cattle, goats, sheep, and (to a lesser extent) poultry. Besides adding nutrients, FYM adds organic matter to the soil that improves soil structure (aeration and water holding capacity) and other soil properties. Farmers are aware of these benefits and listed them side by side with soil nutrient aspects. This shows clearly farmers' holistic understanding of soils, whereby yield is seen as a function not only of nutrient availability in the soil, but also other physical and biological properties of the soil.

b)Jeevamrutham:

This is made from a mixture of sieved FYM powder(200Kgs), Cowpea(2Kgs), Jaggery(2Kgs), Redgram or Horsegram flour(1Kg), cow dung(10Kgs), Cow urine(20 litres). All the materials are soaked in a tin for a week and the contents are stirred once in morning and evening. This liquid is added to the FYM powder and is stored in dry shade. Jeevamrutham is made in such a way that it ready for application in season or can be made in advance and stored in a place. Speaking about its effect farmer Kondappa of Kondapur village. Says," DAP kkanna yekkuva power

choopisthadhi, Inka DAP vesthe varsham rakunte vadi pothadhi. Adhe jeevamrutham ayithe vadipodhu"(This is more powerful than DAP).

c) Vermicompost :

Vermicompost is a newly introduced practice that is spreading rapidly. While there are different methods of making the compost bed and different types of worms used in the process, the overall principal is the same. By decomposing the organic matter, nutrients are more easily available micro-organisms in the soil and therefore ultimately to plants. Depending on temperature, humidity, and nature of the organic material the process takes several weeks. Nutrient composition of the vermicompost varies with substrate that is vermicomposted, but generally contains several diverse microflora that aid in good plant growth. The resulting fine-grained compost can be applied before sowing, or as top-dressing after germination.

d)Biofertilisers:

Seed inoculation of Azatobactor, Rhizhobium and Azospirillum is done so that it helps in nitrogen fixation.

e) Green Manuring

Green manure plants are cultivated primarily to enhance soil fertility by ploughing the plant (generally before flowering) back into the land.

4) Intercropping/Mixed Cropping

Same principle as the crop rotation, but this is done at the same time and space so that an adjoining crop replaces the nutrient extracted from the soil by one crop. Maintains nutrient balance. The adoption of this practice needs seeds of required quantities of diverse crops that are grown in the field. Just like crop rotation, this too has been a significant practice from the farmers' perspective in maintaining soil fertility management and managing crop pest.

5) Selection of crop rotations

Crop rotations play a very important role in restoring soil fertility and minimizing damage due to insect pests and weeds. Legumes that fix nitrogen are typically intercropped or included in rotations. Crops in the study villages included groundnut, Red gram, cow pea, horse gram and green gram.

6) Pest management

The crop protection to reduce the damage due to insect pests to organically grown crops revolves around the use of non-pesticidal management of pests which include cultural, mechanical and biological control methods. Biopesticides are used to control the pests. All these methods help in build up of population of natural enemies of crop pests and play a prominent role in pest management.

a)*Pest Control in Groundnut haulms*

The pest Noomalli which attacks the groundnut haulms in storage is controlled by spreading the green grass spread around the stack at a distance of two meters all around. By next day morning noomalli is seen on this grass which is then collected and thrown away at a distant place.

Similarly Neem Seed Kernal extract helps in controlling- "Aaku mudatha" and "Paccha purugu". Seed treatment of Trichoderma and Rhizobium is done for avoiding bud necrosis.

b)Pancha Patra Kashayalu :

Instead of pesticides organic farmers are using leaf extracted decoction(Kashayalu). Along with neem seed kernel extract, Pancha patra kashayam is one such extract being used by organic farmers. Pancha patra kashayam is made out of a mixture of two kilogram each of Neem + Pongamia + Calotropis + Vitex Negunda + custard apple plant leafs. A paste is made of out of these leafs and is soaked in 50 litres of cow urine for a period of 15 days. Then, it is filtered and for one can of sprayer water,1 litre of extract of these leafs is mixed and sprayed on the field. Hitherto farmers used to spend Rs250-300 for pesticides for one acre. Use of pancha patra kashayam is resulting in negligible cost these leafs are available locally and preparation process is with in the control of farmers. At the most two person days are required for preparing this leaf extract(kashayam).

7) Soil and Moisture Conservation works

Soil and water conservation measures to control runoff and erosion, were important to farmers. Erosion contributes to a loss in soil fertility, especially as the organic and finest (and most fertile) soil fractions are susceptible. Soil and water conservation (SWC) works such as bunding to control erosion will therefore help maintain soil fertility. Watershed development projects focus largely on soil and water conservation measures, usually physical structures and tree planting. Land configuration practices (such as tied ridges) in combination with improved nutrient management can also significantly improve productivity (Selvaraju *et al*., 1999). Earthen bunding, stone bunding, stone clearing and diversion drains were the major soil and moisture conservation works.

Reasons for Shift to Organic farming

Organic farmers were following traditional agricultural practices or conventional agricultural practices prior to shifting to organic farming. A combination of reasons have encouraged the farmers to move towards the organic farming. The reasons revealed by farmers during the focused group discussions are as below.

- In chemical farming the input costs have increased and the soils are getting infertile ("Dantlo Yekkuva Pettubadulu vasthunai, bhoomilo chedipothunnai"). At this juncture NGO, TIMBAKTU created awareness among farmers about organic farming and extended all possible support. Another major advantage was that marketing of organic produce was taken care by Timbaktu.

- Weighing of produce is done accurately by Dharani cooperative(Thookalu karektu)

- The soils were becoming infertile due to chemical fertilizer use and hence the shift to organic farming("Mandhulu yeruvulu vesi bhoosaram kolpothunte").

- Due to climatic changes the crops were not yielding well, soils were becoming infertile. ("Kalamnu batti pantalu pandaka, bhoosaram kolpothunte'). We were looking to overcome this problem. At this juncture, TIMBAKTU came forward with this idea of organic farming which attracted us.

- Many people are interested to do organic farming but there is nobody to hand hold them and support them ("*Janalaku idhi cheyyalani undhi, kani pattukoni cheyinche vallu leru*'). Fortunately, TIMBAKTU gave strong support including technical support through Farmer Field School.

- As the inputs were being given we though it would be good to go for organic farming ("Mandulu, avanni isthunte baguntadhani vachinamu"). "Konni vallu istharu, konni memu chesukuntamu"*some them give where as some we organize).

- This kind oforganic cultivation belonged to our ancestors. Hence, we thought it would be good for us if we take it up.("Peddolla kalaniki sambandhinchindi kabatti cheyalante malli chesthunnam").

- Hoping that the input costs in farming will reduce("Pettubadi thakkuvaithadhani")

- The chemical fertilizers are not giving strength to the soil. ("Government sattuva vesthe bhoomiki pattu ledhu).

- The application of chemical fertilizers is spoiling the fertility of land, crop yields are coming down and our health is getting affected. At this juncture we wanted to reduce inputs costs ,improve our health and get remunerative price for our produce and hence we

quickly accepted the idea of organic farming of TIMBAKTU(Government yeruvulu vesthe, bhoomi karabu ayithundhi, panta dhigubadi ledhu and aarogyam chedipothundhi)

- Despite application of more and more chemical fertilizers, the crop yields were not satisfactory and hence we thought turning to organic farming may increase the crop yields ("Sattuvalesi lesi pantalu baga pandaledhu, sendriya sattuva vesthe pantalu baga panduthadhani anipinchindhi").

- If we use only manure to grow crops the food we eat is more tastier ("Swantha yeruvu thayaru chesukoni panta pandisthe annam baga untundhi thinaneke"). Though we were aware of importance of growing things organically, we took it up only recently as the timbaktu has given some inputs for cultivating the crop.

Yield reduction during Conversion

Regarding the reduction in yields during the conversion from organic to inorganic farming, the farmers during the FGDs expressed that there was not much yield loss for those farmers who had earlier applied good quantities of FYM. For others there was a reduction of 25% yield during the shift to O.F. When asked how could they cope-up with this yield loss, farmers said "pettubadulu levu kabatti saripoyindhi"(as the input costs have decreased in OF the net benefits were O.K).

Improved health due to organic farming.

Farmers felt that stoppage of pesticide application had positive impact on their health. Some of the benefits listed by farmers during the Focussed group discussions are as follows.

- Hitherto on the day of pesticide spray to the field, farmer could never use to get proper sleep due to inhalation while spraying. Where as now with bio-pesticide spray of neem seed kernel extract there is no such problem("Inthaku mundu pesticide spray chesinanadu nidra unda kunde, Kashayam kodithe yemi problem ledhu').

- Earlier we ate store rice which was not doing good for our health ("Anni store biyyam ani antha arogyam levu").

- Earlier it was loss of money on pesticides**.** Despite sprays the crops gets damaged and the pest is not controlled("Panta padaipothadhi, purugu podhu"). Our health gets spoiled and we have problems like itching("Mana arogyma kooda karabu, gulagula etc"). Today even if a bag of neem cake is applied for controlling pest, still nothing bad happens to our health("yapa chekka sanchettukoni sallu yemi kadhu").

- Now due to fodder coming from organic farming fields the health of cattle too is very good ("Ippudu pashuvulaku kooda manchigundhi"). Earlier for the Noomalli(bug) pest they use to spray gamaxene (DDT) to fodder stacks. Now due to organic farming practices this is being not done. Due to this the livestock is eating "gamaxene free

fodder" and is keeping healthy. This can be clear seen from the fact that animal use to show the following symptoms hitherto

1. Appudu daggedhi(the animal use to cough)
2. Paruthayi (dysentery)
3. Neerasanga undevi(less energetic)
4. Feverish

Importance of Livestock for organic farming

Lack of livestock is an important constraint for the organic farmers affecting manorial needs and timely agricultural operations. In study village Chinnapalli, more than 50% don't have livestock among the organic farmers. "Pashuvulunte sendriya vyvasaymku manchidi"says Ramanjaneyulu of cheinnepalli village(livestock is good for OF). When own bullocks are there, we can plough the land when ever moisture is available in the land("Yedlu mana chethulunte yeppudu thema unte appudu dhunnukovacchu"). "Ade tractor ayithe vaniki advance icchi aagali",says, Chenraidu of same village(if we are depending on tractor we need to give advance to the tractor owner and wait for him to come). By that time moisture in the soil may be lost and seed sowing cannot be taken up. Adding to this another farmer says that" Karthilo vanosthe yedlu lenollaki chala ibbandhi avuthundhi"(if the first showers come on time, those who do not own bullocks will face difficulty in ploughing the land).

Another point made by farmers is that the tractor owners have increased the per acre ploughing cost from Rs 450 to Rs 550 citing the hike in diesel prices. But now the diesel prices have comedown but still they have not yet reduced the prices. The table below shows how the cost of cultivation has increased in groundnut.

Table 5.2: Details of increase in input costs in the study area.

Particulars	Cost in 2008-09	Last year cost in 2007-08
Wages	Rs100-150	Rs50
Tractor	Rs500	Rs300
Seed dibbling cost per acre	Rs1000	Rs500
Bullocks	Rs35,000	Rs20,000

Some of the farmers in Kondapur say that due to lack of bullocks the land preparation costs have gone up. Hence people wanted cows and bullocks. Cow give Ganju where as bullocks can be used for ploughing.

Farmers of Ganthimarri, speaking about the importance of livestock for organic farming said, "Maku avi lyakane thippalu"(we face problems in organic farming due to lack of livestock). We need more support for livestock. The multiple benefits provided by livestock are

- Ganju(Urine)
- Peda/yeruvu(Dung)
- Palu(Milk)
- Milk products
- Bhoomiki sedyam chesukovacchu(Timely ploughing of the land can be done). "Tractor tho ayithe rendu thoorlu kottinchukuntaru. Adhe yedlu unte oka thoori kottedi rendu thoorlu koduthamu" (If we depend on tractor for land ploughing insteading of ploughing it twice we do it once due to cost involved. On the contrary if we have a pair of bullocks instead of single ploughing, we plough it twice as the situation is under control).

In Beedanpalli village lot of sericulture activity is seen and the mulberry crop is grown in wide area . Hence, there is fodder scarcity in this village. Where as in Rachur village, those HHs who have livestock after harvesting groundnut immediately sow jowar which supplies fodder to cattle. This is grown on the residual moisture left after harvesting the Ground nut crop. In Venkatampalli , good livestock strength is present. It was found that for a household owning 5 acres, 6-7 livestock can take care of manure needs and ploughing needs of the farmer. In this village 23 organic farming group members are there out of which 13 have livestock and these people share ganju(cow urine) with other members. Some households don't have the capacity to buy livestock. Green fodder is lacking in this village and farmersa have to buy dry fodder for livestock.

In another study village Kondapur, most of the group members do not have livestock and they strongly needed support for livestock specially cow and bullocks. The organic farmers of this village said that due to Korra and jowar cultivation, the fodder availability has increased and hence more livestock can be maintained with existing fodder resources. A typical organic farmers of this village produces gets 6 cart loads of Groundnut hay + 4 cart loads of jowar + Half cart load of Korra gaddi.

Despite knowing the value of Livestock in farming the reason for not keeping it due to farmers inability to buy them. They used to earlier own these livestock. Due to some compulsions they have sold it and are unable to buy them again spending huge amount. *"Pashuvulu lekunte cheloki sendriya yeruvu padadhu" says, a farmer(* if there is no livestock, no chance of adding organic manure to our fields).

Seed:

In Chinnepalli village, in the year 2007-08, farmers saved the seed. But this year(2008-09) crop was not good and hence did not save. "Thella nela loni seed panikiradhu. Adhe yerra nelaloni seed vadukovacchu vitthananiki" ,says, Suggapa (The seed of the crop grown in light red soils is not suitable for seed purpose where as the crop grown in red soil is good for seed purpose).

In Ganthmarri farmers saved the seeds last year(2007-08) as crop was good. But this year(2008-09) the produce quality was not so good and hence did not prefer to save their own seed. Due to this they looking for seed support next year from either TIMBAKTU or agriculture department.

Earlier after rain 6 days *thema untunde, Ippudu 10 rojulu them untundhi.* This helps to take up sowing couple of days late. "Vitthanam veyadaniki late ayina yemi kadhu"(Even if there is delay in sowing nothing happens).

In Shyapuram too, there is no seed saving in this village this year. *"memu appu theesukuntamu kabatti, vitthanamku unchukokunda antha panta ammestham"(as we take loan, we cannot keep produce for seed purpose as we have to repay the loan). As we get money to buy certain inputs. To repay the loan we sell the whole crop not keeping the seed for next season.*

From last two years we are purchasing the seed from TIMBAKTU. They give us charging an interest of Rs 1/ month. Where as earlier the big land lords and money lenders used to charge Rs2/month.

Interestingly, Rachur villagers said that they saved seeds. They save 4-5bags/acre this year. "Aaridra lo vesinollu avutan manchiga unna vallu seed save chesukunaru".

Plants taken up for bio-mass development:

Each organic farmer has planted 100 plants per five acres. Fifty percent survived in majority of the study villages. Seema tangedu, Vepa, Chiguru chetlu, Kanuga and chinta chetlu. Aggi padithe kalipotai. Farmers said, "Aggi padithe kalipothai"(the plants get burnt if it gets caught in fire). Informing the difficulties in protecting these crops, the women say "panta ayipothene mekalu, gorlu meputharu, avi thinakunna thokkesthai". They felt that to protect these plants water supply and proper fencing is essential. Only In Venkatapur village 10 farmers did not taking up planting under bio-mass development programme. The plants of all those who have planted are in good condition till now.

Food habits of the Organic farming families

With the shift towards organic farming, there is a change in the food habits of many households, both interms of type of food and quantity of food. Infact these foods used to find a prominent place in their food basket hitherto. The change is as follows

1. Organic farming families eat Korra rice atleast 4-5 times in a year. Some of the households consume 20-30 times in a year.
2. They are eating more quantities of Sajja(Bajra) and Jonna(Jowar). These crops they ate earlier too, but now they are eating in more quantities and more frequently. "Appudu nelaku ledha padhigenu rojulaku okasair, ipudu varaniki okasari".
3. The health of the family members of the organic farming households has improved. The indicators as expressed by them are
    - "Appudu vollu noppulu"(earlier body pains used to be there)
    - "Padhi rojulakokasari davakhanaku povatledhu"(we are not seeing a doctor even after 10 days).
    - The taste of food grown organically is good.
    - Good quality cooking oil is being provided from Dharani which keeps us healthy.

In study villages like Kondapur farmers said that they are keeping 1/3rd of the total millets crop produced for consumption and the remaining is going for market.

Advantages of Marketing by Dharani cooperative

- Last year in TIMBAKTU marketing, the price was fixed based on weight where as this year it is fixed as per the general market rate.
- Weighing is correct ("Thookalu correct).
- In the open market they loose nearly 8Kgs of produce for each bag of ground nut. This a huge loss. So for each acre on an average the yield is 20 bags which mean 20x 8 Kgs=160Kgs. Which when values comes to almost Rs2500-3000. During Groundnut season, if the financial support is given for weeding. The farmers will be relieved of traders and hence this 8kg loss per bag to private traders in market can be avoided. People are in need of money during the weeding stage. As they get financial support from traders they are forced to sell back the produce to traders and in the process get exploit.
- "Vyaparasthulu thookam yekkuva theesukuntaru, Timbaktu thookalu correct" (The traders in open market deceive us, where as the Timbaktu weighing is correct).
- After harvesting produce is pickedup within a week.
- "*Vyaparagalla badha ledhu*"(no problem with G.Nut traders in open market)
- "*Thookalu correct*"
- Cash is paid quickly-"*Sattuvalaku icchindhi pattukoni thondaraga isthamu*".

- Hitherto, trader used to take 15-30days for making the payment for the produce sold
- Thookalu correct
- Cash is given fast as compared to open market.
- "Kacchithamaina market"
- Last year 5% more price was given than the market.
- This year same price as arket was given
- Dharani cooperative farm gives loans for seeds and for during harvest.

  The per acre Rs1200 loan amount is given for each farmer for purchase of seed. Similarly per acre Rs1000 was given for each farmer for crop harvesting. Here for the loan taken the rate of interest is 1% and if taken outside it will be 5%.

Marketing issues:

Crops like redgram have to be picked up quickly as there may be chances of attack by storage pests. Hence they have to be lifted from farmers immediately and taken to flour mill for making dal. If taken late stored grain pest will attack. "Rashi cheyagane pappu cheyali" says Pallakka. Those who harvested the pigeon pea first had to wait till other farmers harvest their produce. Those who have done early harvesting, their produce will be attacked by the stored grain pests. The produce has to be picked up soon. But unless substantial quantity of pigeon pea is available, Dharani cooperative wont come to pick up the produce. For it to pick up produce atleast minimum 5 farmers should harvest. As they have so many villages it is a problem for them too. TIMBAKTU is also aware of this.

In the study villages it was told by organic farmers that even after three years project period, if grown organically TIMBAKTU will buy it and we will sell them our produce.

Buying procedure of Dharani Farm CO-operative

The crops grown organically are purchased from organic farmers belonging to 15 sanghas of eight villages. Groundnut crop grown in 3 acres of organic farm is purchased from these farmers. This year 5 bags were procured from each farmer from a total of three acres of organic farm. The quantity procured including bag weight is 42 Kgs, but the money is paid for 40 Kgs. For purchase of the produce from farmers, the moisture content of the Groundnut crop should be less than 7 %. Aaroju unna local market dharatho konugollu. The crops is purchased on groupwise basis. The director of Dharani will decide the villages and timing to be procured. "Vitthana runalu, panta kotha runalu, konugolu samayam lone appulu chellinchali"says Pushpa, the Coordinator of the programme. The loan taken for seed purpose and for harvest of the crop have to be settled while seeling the produce to Dharani cooperative which extended loans to them).

Disadavantages of conventional agriculture

1. "*Pantaku unde visham manaku yekkindhi*"(the harmful residues of pesticides got into our body).

2. *"Rasayanika yeruvula thoti bhoomi sunnam ponginattu katukosthadhi*'(with application of more an \d more chemical fertilizer, the soil is becoming saline).

Advantages Of Organic Farming

- We can see the change in soil, it is becoming fertile(Bhoomilo Marpu Kanapaduthunnadi, bhoomi sallavuthunnadhi).

- The soil is holding more moisture resulting in good plant growth. ("Thema yekkuva pattukoni vuntundhi, dhintlo chettu baga abhivridhi avuthundi").

- Application of chemical fertilizers resulted in formation of hard pans, now in organic farming the soil is becoming loose. "Rasayana yeruvu vesthe chekka kattu kuntunde, ippudu sallavuthundhi".

- Our health is good, so is the health of livestock "aarogyam baguntundhi, pashuvula aarogyam baguntundhi").

- Now it is mixed cropping, crop rotation, and border crops within the field.

- When man eat all these food crops he was not having any health problems (25 years back we ate korra, sajja, sama, jonna, aarkalu, ragulu, vulvalu and sankati. "Avanni thinnapudu manishiki kayilalulevu").

- Now too we eat Korra, sama, sajjalu, Jonnaroti and Ragi Mudda. This crop is now not grown in drylands and it is grown under irrig. conditions only.

- Earlier during chemical farming the farmers life was totally disturbed ("Inthaku mundu raithulam allakallolum ayinam").

- There is not much pest problem now. Except that there is problem of "Nalla cheema" which eats up pootha.

- The soil is becoming loose("Bhoomi baga Salluga Ayithundhi").
- The application of chemical fertilizers kills the soil life"Chemicals vesthe sookshma jeevalu vasthai".
- "Good yield"

It was expressed by farmers that after switching over to organic farming, the occurrence of weeds was less when compared to earlier methods of conventional agriculture where chemical fertilizers were applied. The labour requirements are also varying for weeding. Hitherto in

conventional agriculture Per acre 6-8 persons were required after 2 intercultivation operations with dhante. Where as Now in organic farming only 4-6 persons are required after two intercultural operation with danthe. The wage rate is Rs100 to 120 per woman/day. However, In Venkatampalli farmers could not tell decisively whether the requirement of manual labour has increased due to organic farming. However farmers said, that, it differs from field to field.

- Need not buy chemical fertilizer (Government yeruvu kone pani ledhu).
- We need not go out to town from village for bringing the inputs(Dabbulu theesukuni town ki poyi theesukocchedhi ledhu).
- we prepare our own inputs and use in farming (Mana me chesukoni kahsyalu kottukuntamu)
- Now due to organic farming we are saving Rs600/acre for each spraying of pesticide. We are saving nearly 1500-2000Rs in the area of pesticide spraying. Those who could not buy the pesticide left the crop like that. As we are collecting neem seeds and spraying NSKE it is within our hands and very lowcosts. Same farmers are buying neem oil @Rs20/lit. Farmers said that they are also using neem leaf extract mixed in Ganju.

One of the farmer says that "yekuva thema lo vitthanam vesthe panta yerraga vasthindhi"(if sowing is done under too much moist conditions, the crop use to look reddish). After shift to organic farming "Rendu nallu varsham lekunna thattukuntundhi"(Now after shifting to organic farming, the crop withstands moistire stress for a couple of days more). Some more benefits expressed by people are given below.

- "Innallu unde bhoomiki, ippatiki vere rakam ayyindhi'(the soil we see at present is looking bit different than earlier. Meaning it is looking better)
- "dunninappudu melu chese yerralu kanipisthai"(while we are ploughing, we could see the earth worms)-ecological benefits.
- "Thema ippudu varaniki gani untundhi, appudu ayidhu rojulu untunte"(the soil moisture is retained for 10 days now, earlier it was for only 5 days).
- "Market thookalu correct"(The weighing is correct in Dharani cooperative).
- Oka mootaku rendu kejilu vallu theesukuntannaru"(the dharani people take only 2kgs/bag). Where as in open market they used to take some thing like 6-8Kgs/bag.
- "aa roju market yemi unte adhe"(This year the rate was fixed according to the rate in the open market on that day). This year the price is varying between Rs2030-2100.
- In this village one of the farmer who has sown 250gms of Korra got a yield of one quintal.

- Earlier more input costs. After joining Organic farming less input costs and no exploitation by traders . We send the produce to Dharani.

- "Government mandulu dudlu migulu baduthai"(we can save on input costs of chemical fertilizers).
- We had enough manure

- Earlier pest came(RHC). Though we sprayed pesticides it could not be controlled and hence we lost hope on it and returned to organic farming.
- "Bhoomi inthaku mundhu katika barindhi, ippudu methaga ayyindhi"(Earlier the soil was becoming hard where as now it is becoming loose.
- "Thakkuva pettubaditho yekkuva labham"(more profits with lesser input costs).
- Less inputs
- Dependence on local resources
- No need of using government chemicals
  Earlier we used to spend Rs500 per acre as fertilizer cost in conventional farming. Where as now under organic farming we use Podi jeevamrutham which cost around Rs200/acre and is more effective than DAP.

Impact of OF on soil

- "Methagga ayyindhi"(The soil became smooth).
- "Bhomi colour marindhi"(The colour of the soil has changed).
- "Mannu dhunne tappudu loose ga untundhi"(The soil while ploughing is very loose).
- 'Vepa chekka vesthe veru purugu thakkuvandhi"(The root grub was controlled due to application of neem cake).

- Another advantage of organic farming was that soil moisture is retained for 2-3 days more now. During this time seed can be sown.

- In Ganthimarri, the farmers reported that after organic farming the moisture retention increased from 2-3 days to 6-7days.

- The soil become loose (Bhoomi vadhalosthadhi)
- Moisture retention capacity of soil has increased ("Thema yekkuvuntadhi')
- The manure effect lasts for 2-3 years where as chemical fertilizers (" giving more strength to soil").
- More earthworms could be seen ("Sendriya vyavasayam chese sendlo yerralekkuva kanipisthunnai, pakkana mandhulu vese dantlo levu")

Availability of uncultivated foods/weeds in organic farms

The assessment of prevalence of weed presence in Organic and conventional farms reveals that In Organic farms "china gaddi"(grass with small growth) is seen. This does not affect the crop much. On the other hand In conventional chemical farms the prevalent grasses are *Mudakula alam, Gunuga, Neerubailaku and Thummaku.* Where as in organic field their prevalence is less.

Various kinds of uncultivated foods are seen in the organic fields. Farmer Laxmi devi, says that, "*thogiretappudu vatini vidchi pedutham*" (while weeding we leave them without plucking out as it can be used as food). Earlier the uncultivated green '*yerraboddaku'* was predominant in all study villages.

Earlier there used to be more grasses where as now less grasses are seen due to organic farming. Now less weeds(”Ippudu sendriya yeruvula balam nidanamga vasthadi andhuke gaddi kooda melliga lesthadhi”. Adhe chemical fertilizer ayithe fast ga perugathadhi). In Venkatampalli, The group members did not see much difference in the amount of weeds due to organic farming. However they could see a range of uncultivated greens in their village.

Table 5.3: Uncultivated foods consumed in the study villages.

Village	**Type of Uncultivated food available**	**Frequency of consumption**	**Approximate no of times consumed in a year**	**Worth of the quantity consumed by HH in a year**
Venkatampalli	yerrabaddi and Gurugu	1-2 times in a week	20-30 days	Rs 200-300.
Chinnepalli	Gogaku, Chendumalli chettu, Tomato plants and Kalamgari Chetlu(water melon)	Once in a week.	24-30days	Rs360 - Rs450.
Gantemmari	yerrabaddi and Gurugu	Once in a week	20days	Rs 200
Beedanpalli	Chenchali,Gurugaku,Yerrabaddi	5-6 times in a month	40days	Rs 600
Rachur	Gurugaku,Kodijuttu Aaku,Isuka chenchali aaku,Pedda,chenchali aaku,Chilakura,Yerrbaddi aaku and Yennedaraku	2-3 times in aweek	60-70 days	Rs 600-750.
Venkatampalli	Yerrabaddi, Chenchali, Gurugaku, Atakamamidi, Palleraku, Chagodithaku, Isuka chenchali, Ponaganti koora aakuand Polavaku.	Varies from Hh to Hh. Few eat only once in a week and others eat daily	25-50days	Rs 500-1000.
Kondapur	Yerrabaddi, Sanchelaku, Chilakura, Gurugaku, Gogaku, Palleraku, Atiki mamidaku			

The impact of Organic farming on other farmers in the village

The practices adopted by the organic farmers also influenced the other villages in various ways. They are discussed below.

- In some of the villages like Venkatampalli, other farmers in the village too wanted to join the group doing organic farming. Across all size classes farmers are showing interest to join the organic farming group.
- Some are getting influenced positively and they are using more organic manures and Ganju, peda muruga petti.
- Other farmers have started adopting Kashayalu instead of pesticide sprays. Some others used only organic manures.
- Some farmers followed green leaf manuring practice. Seed treatment with trichoderma and rhizobium was done.

In shyapuram, during 2008-09 year under high rainfall conditions the yield is more or less same between organic and conventional farmers. Other villagers are feeling that the produce of organic farmers was sold at a higher rate of Rs100 extra per quintal over the normal market price. ("Valla shenege kaya nooru roopayalu yekkuva poyindhi kadha ane mata vasthundhi")

- It was told that other farmers in the Beedanpalli village also took the seeds of Cow pea, jowar and castor from them. Or at times borrowed in the name of group members.
- In Rachur village due to organic farming project of TIMBAKTU, other farmers also stopped the use of chemical fertilizers. Hitherto a village trader used to sell one lorry dosage of chemical fertilizers**.** But now due to organic farming effect other farmers are also not using these chemicals. These days he is not able to sell even a single bag. Earlier in a days time whole load of chemical fertilizers used to be over. It was selling like a hot cake.

• In village like Kondapur, After seeing the organic farmers, others are also going for the crop diversity. This village has seeds of Groundnut, Kandi, Sajja, Peasrlu, Ayudalu, Alsandalu. Non organic farmers in thei village too were influenced. They have borrowed Seeds, Jeevamrutham and Panchagavya have been borrowed from us said a organic farmer.

Will farmers continue organic farming after the with drawl of TIMBAKTU project

It was interesting to hear from the farmers of study villages in a single voice that they will continue to farm organically in the event of Timbaktu withdrawing after the project period. Oblesu of chennepalli says "Vellu lekapoyina sendriya vyavasayam chese bathukuthamu'(Despite their withdrawl, we will keep doing organic farming).

In Ganthimarri village, when asked whether they will continue the organic farming even after the withdrawl of TIMBAKTU next year the farmers replied, saying, " Mundu chesindhe meeru cheppinaru, andhuke TIMBAKTU aapina memu vesukuntamu"(this kind of agriculture is the one which we used to follow hitherto and even if timbaktu stops support for inputs we will continue to do organic farming). To support their claim they said that already Some of these organic farmers are already cultivating the remaining land (other than 3 acres of land for which Timbaktu supports) also with organic farming practices.

Things to be done for easy spread of organic farming.

Though farmers are happy with the support received for taking up organic farming, they have suggested some key areas which need the attention and also the support. These are given below.

- More FYM is necessary. For this Livestock development has to be supported. If the livestock is provided there may not be much problem for fodder in some of the villages like venkatampalli where they were confident of getting required fodder from their own lands and remaining will be brought from other sources. ("Lenollaki pashuvulu iyyali"). Those who do not have livestock have to be supported so that they do well in organic farming. 2 bullocks + 2 cows. Can meet the requirements of 3-4 acres of organic farm. Hay from five acres of land is sufficient for 1 pair of bullocks for whole year. If necessary we also buy vari gaddi @Rs500/bandi. A bandi will be sufficient for a pair of bullocks for 1 month. According to Beedanpalli villagers, they needed support for the purchase of cows. "Maku yemi lekunna, aavulu isthe sendriya vyavasayam chesukuntam"said a farmer (The cows can be milch purpose or for ploughing the land).

- Support for other soil fertility enhancing inputs was demanded by farmers. These include tank silt application, or any other organic matter. They suggested that mixing of tank silt in FYM compost heaps can be supported.

- It was felt by farmers that the support by TIMBAKTU organic farming project @ 100Kgs of neem cake per acre was not sufficient. Application of Neem cake @ 200 Kgs Per acre will totally control root grub. More over, due to neem cake application the soils are becoming fertile.

- TIMBAKTU provided good quality seed and hence they should support us more in this area. Now this year(2008-09) the quality of the crop is not so good and is of third grade and hence was not saved for seed purpose. "Itthanamku nice ga undale",says, farmer Muthyalu of Venkatampalli village.

- Vermicompost unit have to be encouraged. Now agril. Department is giving subsidy only for bigger units. Farmers have to contribute an amount of Rs 20,000 as their share. This is not possible for all farmers. Specially the small and marginal.

- One bullock cart for few families should be given which helps to transport inputs to the field. For eg carrying agril. Implements, carrying tank silt, sand to field.

- “Maku vepa chekka, matti tholisthe baga untadhi”(for use neem cake and tank silt is very useful).

- As our soils are sloppy, Soil and moisture conservation works are needed.

- In Ganthi marri village certain cases during the first year when shifted to OF the yield has increased from 15-20 bag/acre to 30 per acre. This has happened because Groundnut was replaced(due to delayed rains) in the year preceding to taking up of organic cultivation by horse gram and jowar. Horsegram being a nitrogen fixing leguminous crop improved soil fertility, Due to this, in the very first year of organic farmers got bumper yields. Another important reason was that the crop rotation has taken place and Red Hairy Caterpillar was controlled and there was no RHC presence in the first year of organic farming.

- More trainings on the organic farming practices

- Farmers also demanded better quality seeds of Ground nut, Castar, Alasandalu, Korra and other chiru dhanyalu.

Chapter 6

Conclusions

Organic farming Practices

Organic farmers have been using a range of organic agricultural practices which are based on local resources. Due to this the input costs were less reducing the cultivation expenses of organic farmers. As the practices were based on local resources the farmers had control over the things they wanted to do.

Support to Local Livelihoods

It is clearly evident from the empirical data that various organic practices related to seed treatment, soil fertility enhancement, pest management, Livestock care have provided employment to villagers and there by supported their livelihoods. Hitherto most of the money was going to the big companies which are involved in agri-business.

Ecological Benefit

The soil sample analysis clearly indicates that there is change in soil fertility due to increased organic carbon percent. This supports soil life greatly which inturn contribute to enhancement of soil fertility through biological process. Farmers during FGDs revelaed that with use of more organic manures there is more binding between soil particles. Another interesting development was that the availability of uncultivated foods has increased in the organic plots as compared to Hitherto.

Economic benefits

It is bit difficult to come to conclusions abut the economic viability of organic farming as compared with conventional farming. The year 2008-09 has seen abnormally high rainfall affecting the yields drastically in both in organic farms and conventional farms. However it was clear from the empirical data that input costs were much lesser in the case of organic farming which resulted in lesser economic losses for organic farmers. However during the FGDs it was clearly brought out by farmers based on their three years of Organic farming experience that the peracre economic benefits were more in organic farms. Despite slightly lesser yields this was possible because there was a significant reduction in the input costs of organic farms.

Good Market support

This was a very important factor which motivated the farmer to takeup organic farming. Each and every single farmer in the study area was appreciative of the accurate weighing procedure adopted by Dharani Co-operative. Farmers were paid slightly higher price than open market(but in the year 2008-09, it was same). Due to correct weighing procedure adopted by Dharani Cooperative organic farmers are saving an amount ranging between Rs2000-Rs3000 per acre which is a substantial amount for small and marginal farmers.

Millets in Farming

It is evident from the empirical data of the research study that millets are back into farming system enhancing the food and nutritional security of sampled households. Millets like Jorra, Jowar and Bajra have found prominent place in the fields of organic farmers.

Enhancement of Agro-Biodiversity

The comparative analysis of organic farms and conventional farms revealed that there is huge crop diversity in the organic farms. This has positive implications for soil fertility management, pest management, withstanding risk of climate changes, more of mixed and intercropping was seen in organic farms. Similarly the adoption of crop rotation was more in organic farms which also has positive impact on soil fertility and management of pests.

Livestock Necessity

It could be seen from the research data that not much difference is their regarding livestock population with both organic and conventional farms. Organic farms needed more natural manure and the lesser livestock population with organic farmers made it difficult for them to meet manorial needs. It was argued by organic farmers during the FGDs that there is a need for a very strong support for livestock especially bullocks and cows for better results in organic farming. They not only help in timely agricultural operations but also provide crucial inputs like dung, urine etc.

It can be summedup that organic farming was doingwell as compared with conventional farming on several fronts. The input costs of organic farmers has reduced substantially and the farmer is very happy as it is not pushing him into debts. In addition to this organic farming was providing several ecological benefits. Strong support for livestock development will help the farmers to reap greater benefits from organic farming.

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