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ABSTRACT

This review paper attempts to bring together different issues in the light of recent developments in organic farming. The ill effects of green revolution has encouraged the farmers to take up organic farming. This paper traces the history of organic farming and reviews the global and Indian scenario with reference to organic farming. In India, the cultivated land under certification is 2.8 million hectares. The key issues emerging in organic farming include yield reduction in conversion to organic farm, soil fertility enhancement, integration of livestock, certification, ecology, marketing and policy support. The potential for organic farming, especially in dryland regions is discussed. Organic farming is productive and sustainable. There is a need for strong support to it in the form of subsidies, agricultural extension services and research.

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I Introduction

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 needs, farmers using these technologies have to depend upon purchased inputs. The small farmers, who by definition are short of cash, are therefore found to lag behind large farmers in the adoption of technologies.

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 problems. It is perhaps owing to these input issues and their negative impacts, that the 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 anthropogenic greenhouse effect, producing about 50% and 70%, respectively of the overall anthropogenic CH_4 and N_2O emissions.

Modern agriculture farming practices, along with irrational use of chemical inputs over the last four decades have resulted not only in loss of natural habitat balance and soil health but have caused many hazards like soil erosion, decreased ground water level, soil salinisation, pollution due to fertilizers and pesticides, genetic erosion, ill effects on environment, reduced food quality and increased the cost of cultivation, rendering the farmer poorer year by year (Balak Ram 2003). Farmers do not find agriculture a viable proposition any more and infact a large number of farmers have committed suicides (Deshpande, 2002). Some of the factors that contributed to the present crisis in farming could be the shooting up of price of factory made external inputs and the government's slow withdrawl 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). In other words, local indigenous farm techniques have been wiped out and replaced by the modern techniques resulting in 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. The principle of organic cultivation is attracting farmers world over due to its various advantages over modern agricultural practices. Organic agriculture encompasses several farming methods and approaches. Essentially, it is a farming system which supports and strengthens biological processes without recourse to inorganic remedies such as chemicals or genetically modified organisms. Farmers imitate at the farm level various processes found in the eco-system. 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). Many state supported agencies, Non-governmental Organizations (NGOs) and individuals started experimenting with organic methods of food production in the recent past.

The most popularly accepted definition of organic farming is as follows, " 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 fulfill 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, disc plant, cultivate), synthetic fertilizers and pesticides. It is characterized by a high degree of crop specialization. In contrast organic farming is characterized by a diversity of crops.

Organic farming is not a "new" concept. However, it was marginalized against the large-scale chemical based farming practices that have steadily dominated food production over the last 45 years. The difference between organic farming and modern conventional farming accounts for most of the controversy with claims and counter claims surrounding organic agriculture and organic food. The comparison is summarized in table 1.

Table 1: Comparison between Organic and Conventional Agriculture

Parameter	Organic	Conventional
Size	Smaller, marginal, dependent operations	Large scale, economically tied to major food corporation
Method	No use of purchased fertilizer and other inputs, e.g. pesticides, weedicides etc. less mechanization of the growing and harvesting process. Use of organic inputs like green manure, vermicompost, biofertilizers etc.	Heavy use of chemicals e.g.fertilizers, pesticides . etc mechanized production using special equipment and facilities.
Technology	Nature based, environment friendly and Sustainable	Synthetic, harmful to environment and nutrient depleting.
Products	Good taste, flavour, nutrition and free from chemicals	Tasteless, less nutritious, may contain toxic residues of chemicals
Market	Local, direct to consumer, on farm stands and farmers markets and through special wholesalers and retailers.	Wholesale with products distribution across large areas (average supermarket produce travels 100 to 1000 km) and sold through high-volume.

In this paper, an attempt has been made to bring together various issues related to organic farming in the light of recent developments at the global, national and state level. This paper examines the status, issues and prospects in Indian organic farming, highlighting its potential in the semi-arid dryland areas. This paper is organized in six sections. Section one is an introduction to the study. Section two profiles the history of organic farming. Section three reviews the global status and the Indian scenario regarding organic farming. In section four the key issues related to organic farming such as yield reduction in conversion to organic farm, soil fertility, livestock, certification, ecology, marketing and policy support are discussed. The fifth section reviews the special benefits

of organic farming in the drylands of India. The last section makes some concluding observations.

II 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.

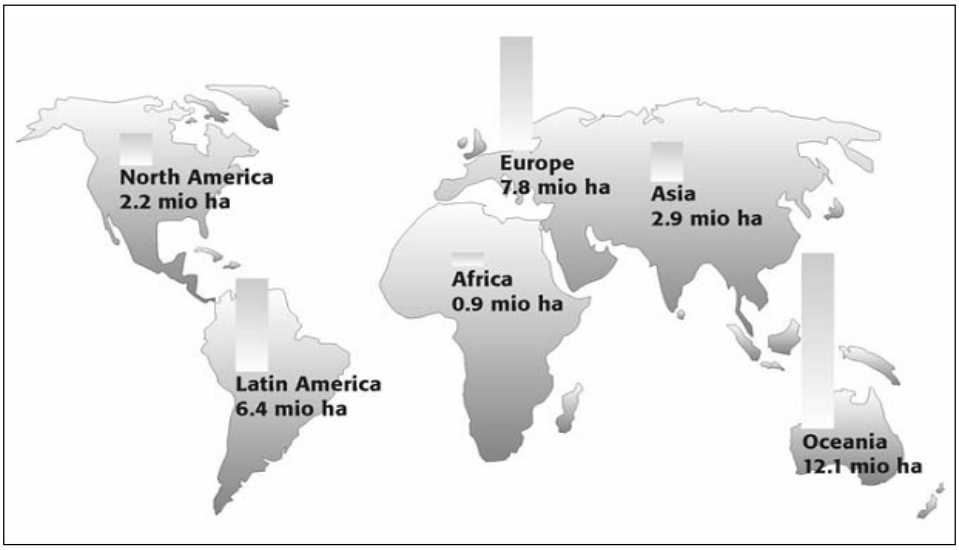
In 1972, the International Federation of Organic Agriculture Movements (IFOAM), was founded in Versailles, France. It is an umbrella organisation for organic agriculture which developed international basic standards for organic agriculture and went on to establish IFOAM accreditation programme (1992) 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.

III 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: 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, 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 3: 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 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.

Table 4: 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).

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.

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 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 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 manurial 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 sustainable agricultural development (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).

V Prospects for Organic Farming in India

India is endowed with various types of naturally viable organic farm of nutrients in different parts of the country which will be helpful in organic cultivation of crops (Butterworth et al, 2003). This will help for organic cultivation of crops substantially. There is diversity in climate and eco-system. India has a strong traditional farming

system with innovative farmers, vast drylands and least use of chemicals. Infact, the rainfed tribal, north east and the hilly regions of the country where negligible chemicals are used, are practicing subsistence agriculture for a long period. Such areas are organic by default.

Special Benefits of Organic Farming in the Drylands of India

Organic farming has assumed immense significance in the present context, especially in the dryland areas. Soil and climatic conditions in India's drylands make them particularly well suited for organic agriculture. These marginal lands, with their marginal soils do not respond well to intensive farming practices. They are actually better suited for low-input farming systems that make ample use of the biodiversity (Sharma 1998 and Pionetti and Reddy 2002). In turn organic farming with its central focus on maintaining and improving soil health, its avoidance of pollutants, and its reliance on local inputs and labour, can materially advance the economic and ecological health both of the drylands, and of the people who live there.

Semiarid and arid dryland soils typically are poor in water holding capacity as well as organic matter (Sharma, 2000). In some areas, depth of the soil is another limiting factor for agricultural production. Addition of organic matter, a corner stone of organic farming practices, will not only improve the physical condition of these dry land soils, but also greatly improve their ability to supply balanced plant nutrients. In drylands, there is over-exploitation of natural resources (Reddy, 2000) mainly because of inappropriate production-enhancing technologies (Dhir, 1997). For example, use of tractor increases wind erosion and damages natural regeneration of trees and grasses. Over use or improper use of canal irrigation can cause water logging and salinity. Excessive groundwater pumping has decreased the ground water table drastically in tube-well irrigated areas. In many locations where intensive-input agriculture systems are followed, soil fertility is decreasing and certain pests are becoming resistant to synthetic pesticides (Butterworth et al, 2003). These are all indicators of improper land use leading to desertification; adoption of organic farming practices suitable for drylands can help to ameliorate these conditions.

Due to climatic variability, farming systems in drylands traditionally use a mix of crops, trees, animals, grasses, etc. Such diversified systems have been found efficient in nutrient recycling and restoration of soil fertility, the basic aims of organic farming; they minimize pest incidence as well. Furthermore, India's traditional farmers possess a rich body of wisdom, based on long observation and practice, concerning soil fertility management and pest control; this can be used to strengthen organic systems (Sharma and Goyal

2000, Adolph and Butterworth 2002 and Butterworth et al 2003). These two factors will also aid the quick development of more efficient, more productive organic farming systems in these areas. In terms of input supply, the drylands are very rich in local resources that are suitable for supporting organic farming.

VI 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. Organic agriculture has been neglected in the agricultural policy. There is therefore, very less government assistance for the promotion of organic agriculture, as it exists for conventional agriculture in the form of subsidies, agricultural extension services and official research. Given proper encouragement, organic farming will progress tremendously in India, especially in the dryland regions of the country, taking advantage of the diverse soil and climatic conditions.

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