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Organic Farming: Status, Issues and Prospects – A Review[§]

B. Suresh Reddy
Research Unit for Livelihoods and Natural Resources (RULNR), Centre for Economic and Social Studies (CESS), Begumpet, Hyderabad-500 016, Andhra Pradesh

Abstract

This review paper attempts to bring together different issues in the light of recent developments in organic farming. The after effects of green revolution have encouraged the farmers to take up organic farming. This paper has reviewed the global and Indian scenario with reference to organic farming. In India, the cultivated land under certification is 2.8 Mha only. The key issues emerging in organic farming include yield reduction in conversion to organic farm, soil fertility enhancement, integration of livestock, certification constraints, ecology, marketing and policy support. The potential for organic farming, especially in the dryland regions has been discussed. It has been argued that organic farming is productive and sustainable, but there is a need for strong support to it in the form of subsidies, agricultural extension services and research.

1. Introduction

Green Revolution (GR) technologies, supported by policies, and fuelled by agrochemicals, machinery and irrigation, are known to have enhanced agricultural production and productivity. While these technologies greatly helped to address the food security of iIndia, farmers using these technologies have to depend upon the purchased inputs. The small farmers, who by cash flow definition are short of cash, are therefore found to lag behind large farmers in the adoption of technologies. The manufactures of fertilizers and pesticides, the two major inputs of GR technologies, need fossil fuels and / or expensive energy, and are 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 practised today (conventional agriculture, modern agriculture or GR agriculture) accounts for about one-fifth of the anthropogenic greenhouse effect, producing about 50 per cent and 70 per cent, respectively of the overall anthropogenic methane and nitrogen oxides emissions.

Modern agricultural farming practices, along with irrational use of chemical inputs over the past four decades have resulted in not only loss of natural habitat balance and soil health but have also caused many hazards like soil erosion, decreased groundwater level, soil salinization, 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 (Ram, 2003). Farmers do not find agriculture a viable proposition any more and in fact, 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 the price of factory-made external inputs and the government's slow withdrawl of investment as well as market intervention and more significantly,

* Author for correspondence,
E-mail: Srihithasuresh@yahoo.com

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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 an 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. Essentially, it is a farming system which supports and strengthens biological processes without recourse to inorganic remedies such as chemicals or genetically modified organisms. Organic agriculture is productive and sustainable (Reganold *et al*., 1993; Letourneau and Goldstein, 2001; Mader *et al*., 2002). Many state-supported agencies, non-governmental organizations (NGOs) and individuals have started experimenting with organic methods of food production in the recent past.

The most popularly 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 wherever 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, cultivator), 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.

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 levels. This paper has examined the status, issues and prospects in Indian organic farming, highlighting its potential in the semi-arid dryland areas. This paper is organized into five sections. Section 2 reviews the global status and the Indian scenario regarding organic farming. In section 3, 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. In section 4, the special benefits of organic farming have been reviewed in the drylands of India. In the last section, some concluding observations have been made.

2. Status of Organic Farming

World Scenario

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 (Mha) globally, managed by more than 1.2 million producers, including smallholders. In addition to agricultural land, there are 0.4 M ha of certified organic aquaculture. Among the countries involved in organic farming, about 65 per cent are developing countries. The regions with the largest areas of organically managed agricultural land are : Oceania, Europe and Latin America. 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 Mha — is located in the developing countries. Most of this land is in Latin American countries, while Asia and Africa take the second and third places, respectively. On a global level, in the year 2008, organic land area increased by almost 1.5 M ha compared to the data for the year 2006. About 28 per cent (or 1.4 Mha) more land under organic management was reported for Latin America (including 0.9 M.ha of in-conversion land in Brazil for which no data was available previously). In Europe, organically-managed land increased by 0.33 Mha (+ 4%) and by 0.18 Mha (+27%) in Africa (Willer and Klicher, 2009).

It can be seen from Table 1 that Austria has the highest percentage (8.40%) of area under organic farming, followed by Switzerland, UK and Germany. In India, only 0.03 per cent of the area is under organic farming, though there is huge scope for bringing more land under organic farming.

Organic Farming in India

India has traditionally practised organic agriculture, but the process of modernization, particularly the green revolution technologies, has led to the increased use of chemicals. In recent years, however, limitations of

Table 1. Percentage of area under organic farming in the total cultivated area of different countries of the world in 2004

Country	Percentage of area under organic farming
USA	0.23
UK	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)

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 awareness. Exports also played a role but perhaps lesser than in other countries.

The 10th Five-Year Plan encouraged the promotion of organic farming using organic wastes, and integrated pest management (IPM) and integrated nutrient management (INM) practices (GoI, 2001). 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. Presently, many states and private agencies are involved in the promotion of organic farming in India, these also include several ministries and government departments at both central and state levels.

The Government of India has also launched the National Programme for Organic Production (NPOP) in the year 2001. 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 in agricultural 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 M ha (2007-08), which includes one million hectares under cultivation and the rest is under forest area (wild collection). An estimated 69 Mha, however, is 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). Smallholders and resource-poor farmers may not be able to afford the cost of certification, they are 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 supply to the local markets in case of irregular surpluses. Such barriers pose difficulties for farms to reap potential benefits of organic certification.

India produced around 5,85,970 Mt (Table 2) of certified organic products including all varieties of food products. India exported 86 items in the year in 2007-08 — the total volume being 37533 Mt. The export realization was around US $ 100.4 million, registering a 30 per cent growth over the previous year. Organic products are mainly exported to EU, US, Australia, Canada, Japan, Switzerland, South Africa and the Middle East countries. Cotton leads among the products exported (16,503 Mt).

Table 2. The status of organic production in India: 2006-2007

Total area under certified organic cultivation	2.8 M ha
Total production	585970 Mt
Total quantity exported	19456 Mt
Value of total export	Rs 30124 lakh
Number of farmers	141904

Source: GoI (2008b)

Table 3. Export of organic products by APEDA for the year 2007-08

Particulars	Quantity, tonnes	Value, lakh Rs
Floriculture	46398	48227
Fresh fruits and vegetables	1724574	243711
Processed fruits and vegetables	774849	245145
Animal products	1932856	512927
Other processed foods	3220200	652315
Cereals	9752246	1484736

Source: GoI (2008b)

The states of Uttarakhand and Sikkim have declared their states as 'organic states'. In Maharashtra, since 2003, about 5 lakh ha area has been under organic farming (of the 1.8 crore ha of cultivable land in the state). 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. In Karnataka, 1513 ha land was under certified organic farming, and 4750 ha was under non-certified organic farming by the year 2005. The major reasons for shift towards organic farming include sustained soil fertility, reduced cost of cultivation, higher quality of produce, sustained yields, easy availability of farm inputs and reduced attacks of pest and diseases. 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 ha area is under organic farming. States like Rajasthan, Tamil Nadu, Kerala, Madhya Pradesh, Himachal Pradesh and Gujarat are promoting organic farming vigorously.

Farmers organizations such as 'Chetana' have been established for the marketing of 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). However, the farmers had to face several problems while converting from conventional to organic farming. Lanting (2007) has identified some of the problems as follows: Non-payment of premium price for these products because they are in the transition stage, lack of storage facility, 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 should lend a helping hand during 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) has argued that organic farming is an intensive process, limited mostly 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 has concluded that the scope of coverage and social relevance of the organic farming is also limited. Instead, he has proposed ecological farming whose main objectives are maintenance of high productivity, reduction in production cost and enhancement in self-reliance. It caters to both resource-poor and the resource-rich farmers; 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 is to focus on selling pesticide-free produce in the local market; the third is establishment of community managed seed banks; and finally, the fourth step is to adopt non-chemical methods of nutrient management. It has been argued that the ecological method is indigenous but is gradually disappearing due to constraints in labour availability. According to Sanghi, there is a great scope for its revival by utilizing the incentives of labour under the National Rural Employment Guarantee Act (NREGA).

Organic Agriculture in Andhra Pradesh

It was in the early-1980s that the Permaculture Association of India popularized the concept of 'Permaculture' (permanent agriculture) in AP. Permaculture is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems (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. The DDS encourages 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 have adopted sustainable agricultural practices, which are environment friendly and are based on the traditional knowledge. 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, wherein the use of pesticides and chemical fertilizers is discouraged, while the use of local resources is encouraged. The Community Managed Sustainable Agriculture program is being implemented by the Society for Elimination of Rural Poverty (SERP), the Government of Andhra Pradesh and the Sustainable Agriculture Network of NGOs, with technical support from the Centre for Sustainable Agriculture. In 2009, there were 50 villages which had become pesticide free and 7 villages which have become completely organic. The Timbaktu Collective is another organization which has been promoting organic farming practices since a long time in the Ananthapur district.

The Government of Andhra Pradesh has initiated programmes related to organic farming through the Departments of Agriculture and Horticulture. The Agriculture Department of AP had taken up the promotion of organic farming in the state during the year 2008-09 by implementing several schemes with an outlay of Rs 18.29 crore. Similarly, the Horticulture Department of AP is implementing the organic farming scheme under the State Horticulture Mission (SHM) from the financial year 2008-09. 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. Acharya NG Ranga Agricultural University has also been conducting comparative research studies between organic farming and conventional farming since 2007 *rabi* season at all its research stations in the state. Each research station is conducting trials on the predominant crop grown in that area.

3. Can Organic Farming Feed the World?

A common question asked about 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 successfully feeding the world? Even the 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 period. 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. Not withstanding all this, 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) and some of the major issues involved in organic farming are discussed below.

Yield during Conversion from Conventional to Organic Farming

Farmers largely convert to organic farming because of the uneasiness experienced with the existing agriculture system, which is predominantly based on chemicals. Some farmers perceive chemical agriculture to be health hazard for themselves. However, personal health is not the only reason to convert to organic farming. Farmers in Punjab, Haryana and Eastern Uttar Pradesh are able to maintain their yield levels only through a drastic increase in chemical inputs. Yields in irrigated farms may go down during the conversion period from conventional to organic farming because the crop yields are boosted by artificial fertilizers and it takes time for the soil fertility to get boosted. However, after conversion, yields will be equal, if not higher than the yield during the conventional farming. In the rainfed farming, the situation is different; yields are significantly lower and thus, the difference in yields between the conventional and conversion period is narrow. Though comparative yield studies are only a few at both global and national levels, certain studies have provided a broad indication about the productivity of organic farms vis-à-vis conventional farms. Conversion from the 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 the manurial needs of farmers. Organic farming can compete economically with conventional farming when specific 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 *et al*., 2009).

In the 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 the growers with direct economic benefits by decreasing the cost of inputs, thereby increasing net returns (Brenner, 1991). It was reported by 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. Most organic farming 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 neighbouring conventional farmers that motivated them towards organic farming (Alvares *et al.,* 1999; Sharma, 2005).

Recently, based on their experiments going on for 25 years in Switzerland, Mader *et al*. (2002) have reported sustainable yields (though marginally reduced in some years) without agrochemicals in the temperate climatic conditions. On the other extreme, most agricultural scientists believe that without chemical fertilizers, large quantities of farm yard manure (FYM) and other biomass material that will be needed to compensate for the fertilizers are not unavailable. They also believe that there are several crops that cannot produce high yields without the use of agrochemicals, fertilizers in particular and therefore, practising 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 inputs, thus making poor households less crisis-prone. These are weighty arguments, especially in the marginal locations (Julia *et al*., 2008)

Lockeretz *et al*. (1978) have 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 per cent lower on the organic farms. But since the cost of production was also less, the net income per unit area was comparable for both the systems. A study by Roberts *et al.* (1979) has 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 higher on the organic farms. Both the studies have shown that production costs were lower 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) made a comparison between three organic and three conventional farms and found that net income per unit area was 38 per cent higher on the conventional farms. However, the author of a follow-up study of six organic farms has found that net returns on organic farms were 22 per cent higher than on the representative conventional farms (Kraten, 1979). Berardi (1978) has 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 returns 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 size, which made it difficult to conduct any statistical test 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 works by Eberle and Holland (1979) and Berardi (1978). Finally, none of the studies has 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 the 213 respondents, 88 per cent reported that their net income either stayed the same or increased when they began farming with fewer purchased inputs, while 12 per cent claimed a decline in net income. 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 purchased inputs of chemical fertilizers and focused on the production of chemical marketable agricultural commodities. Yet, as the Punjab experience has shown, the fertility of soils cannot be restored by NPK from factories, and agricultural productivity necessarily includes returning to the soil a 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 technologies 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).

The FYM has always been one of the principal means of replenishing soil losses (Albert, 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 protect crops against adverse temperature effects, improve seed germination, increase water retention capacity of the soil and create the right micro-climate for the development of beneficial soil microbes (Sharma, 1991; Reddy, 2010a). 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 have revealed that organic farming may help combat desertification (Alam and Wani, 2003).

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*. (2003) in their 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 and attempt to make a net gain. What was '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 and who looked only at the market, not at the life of the soil. The healing and recovery of soil health will not emerge by continuing to cling to the market as an organizing principle for agriculture. This recovery lies in rediscovering natural ways of renewing and learning,

once again, to see that the soil has a right to share its produce to maintain its health. 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 its sustainability. Apart from providing additional income, livestock generates employment in the rural area itself. Livestock contributes directly to agriculture by producing manure and influencing the availability of organic carbon to soil. It contributes indirectly through its influence on income 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 draught 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 strengthens the capacity of a household to invest on productivity enhancing measures through purchase of off-farm inputs (George, 1996). Earnings from the landholdings of a majority of marginal, small and semi-medium farmers alone are not adequately sufficient for the household round-the-year and livestock rearing provides an alternative to these smallholders (Joshi and Jha, 1981).

The livestock economy is changing very fast in Andhra Pradesh. The growth of draught animal stock has slowed down compared to the growth of milch animal stock, the latter is growing relatively fast. Across milch animals, the proportion of cross-breeds is also growing rapidly (Conroy *et al.*, 2001; Reddy, 2001; Adolph and Butterworth, 2002). The reasons for this include reducing farm size, increasing mechanization, declining area of common property resources (CPRs) and reducing pattern in labour availability (Conroy *et al*., 2001). This has important implications for the availability of manure. Local animal breeds being 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. A jury of '*Prajateerpu*'(farmers) 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 sufficient government support to re-introduce livestock into agriculture. Declining fodder and water resources combined with blanket animal-breeding policies are fuelling 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 fostered more widely. 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 animal power in rainfed ecosystems. We need to identify critical and timely requirements of the draught power in the production systems besides the extended use of available draught power during less critical periods. Thus, livestock production, being a self-income generating enterprise, reduces the irregularity and uncertainty in income from farm business (Anonymous, undated). A combination of agriculture with dairy and poultry farming fetches the small farmers more average net income than the other enterprises (Krishna Rao, 1992).

With the weakening of forest and livestock linkages, the nutrient management system has become closed. Also, reduction in the common property resource areas will lead to a decrease in the availability of nutrients to soil.

To sum-up, livestock is crucial not only to help maintain soil fertility, supply of draught power and food for the farm-household but also to increase agricultural productivity.

Institution/Certification

The organizational structures supporting smallholder organic agriculture in India fall in 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, Santacoloma (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 smallholders 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 not enthused the farmers so far. Added to this, the export volume of the state is fairly low and therefore neither the farmers nor the consumers find it worthwhile to go for certification (Rao and Larja, 2005). Thus, a large segment of the organic farming community remains marginalized and is unable to get the premium on its produce. Some kind of support structure is needed, especially for the resource-poor small farmers to successfully venture into the organic farming. The main reason for this is the financial and other constraints confronting the farmers in the initial 'conversion' phase of a switchover from non-organic to organic farming. The conversion period is basically the time between the start of organic management and the certification of crop or animal husbandry. It is the time taken to neutralize chemical residues, if any, left behind in the soil by practised agricultural techniques. Unlike conventional agriculture where standardized chemical inputs are used, organic farm management does not depend on a uniform strategy.

The standard duration of conversion period is 24 months for annual crops, and for the perennials, it may extend up to 36 months. However, the certification authority has the discretion of extending or reducing the duration of the conversion period depending on the ecological conditions at 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 labelling from an authorised 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 the 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 a third party certification in which small-scale farmers may be certified in groups under an Internal Control System (ICS). The third scheme corresponds to the participatory certification called the Participatory Guarantee System (PGS), which targets local or national markets and involves the participation of small farmers, small entrepreneurs, traders and consumers in the certification process. The PGS is an initiative largely coming from the developing world wherein the systems of quality assurance are directly managed and controlled by organic producers. Importantly, there is no universal model for the PGS. Each variant is adapted and is specific to the individual communities, geographies, politics and markets of their origin.

A 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, and internal control system, 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 conserving energy, soil nutrients, fish, wildlife and insuring the supply of food for the future generations. However, virtually no credible data are available to policymakers 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, evaluated and addressed. Organic farming is an attractive alternative for both farmers and policymakers (Cacek *et al*., 2009).

The new bio-chemical technology in agriculture, however, has many negative impacts on the environment. There has been a 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 1980s, it was realized that for the sustainable development, alternative farming practices are needed (Mahendra Dev and Painuly, 1994). 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 is 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. These findings do 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.

It has been found that in places like Chhattisgarh where organic agriculture is popular, the farmers who try to practise organic agriculture suffer, as the upstream farmers may be using chemicals which permeate into the fields of farmers practising organic cultivation and the produce would be found contaminated during chemical analysis due to the residual effect across the fields. This is more so in the 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 community is jointly sensitized and mobilized to give up inorganic practices (Rao and Larja, 2005).

The major factors that lead to growing interest in the alternative 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 increasing steadily in both the developed and developing countries at an annual average growth rate of 20-25 per cent (Ramesh *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 the developing countries such as India.

A comparative study on 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 per cent and increased infiltration by about 10 to 25 per cent, 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 requires not only additional costs but also specialized skills, know-how and experience — all of which the unorganized individual farmers are usually

incapable to develop (Kasturi, 2007). About 85 per cent 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 the farmers converting to organic methods in agriculture.

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 to be able to buy and sell at a better price and also to help small farmers in adapting new patterns and facing much greater levels of competition. Small farmers require professional training in marketing as well as in the technical aspects of production. There is also a 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 addition in the supply chain (Singh, 2006).

Policy Support

Policies have long focused on generating external solutions to farmers' needs. It 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 (1988) has 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 so that the farmers' own analyses could be facilitated and their organized needs articulated. Dialogue and interaction would provide a rapid feed back, allowing policies to be adapted alternatively. Agricultural policies could then focus on enabling people and professionals to make use of the most of the available social and biological resources.

Despite serious efforts of some NGOs, it appears that India is lagging far behind in the adoption of organic farming. For laying the spadework for the spread of organic agriculture in the country, certain issues require attention at the government policymaking 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) simplification of the process of certification; and (e) reduction in certification cost. A vigorous campaign to highlight the benefits of organic farming against the conventional system is essential to increase awareness of both 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, the government 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 Departments of Horticulture and, 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 Larja, 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. Under such situations, collaborations 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 a trustworthy and effective arbitration in the best interests of the resource-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, and Punjab. In the "Uttarakhand organic" initiative, a multi-pronged strategy—the organic model—has 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).

4. Prospects for Organic Farming in India

India is endowed with various types of naturally viable organic form of nutrients across different regions of the country which will be helpful in organic cultivation of crops (Butterworth *et al*., 2003; Reddy, 2010b). This will help substantially in organic cultivation of crops. There is a wide 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 hilly regions of the country where negligible chemicals are used in agriculture, have been practising 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 dryland areas also. Soil and climatic conditions in India's drylands make them particularly well suited to organic agriculture. These marginal lands, with their marginal soils do not respond well to intensive farming practices. These are actually better suited to low-input farming systems that make ample use of the biodiversity (Sharma, 2000; 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 of the drylands, as well as 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 dryland 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 waterlogging and salinity. Excessive groundwater pumping has decreased the groundwater table drastically in tube-well irrigated areas. In many locations where intensive-input agriculture systems are followed, soil fertility is decreasing and certain severe 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, and grasses. 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 and pest control management; this can be used to strengthen organic systems (Sharma and Goyal, 2000; Adolph and Butterworth, 2002; Butterworth *et al*., 2003; Reddy, 2010b). 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.

5. Conclusions

The literature review has shown that opinions about organic farming are divergent, 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 dissemination of know-how. However, many studies have revealed that organic agriculture is productive and sustainable. 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 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, and therefore there is less government assistance for the promotion of organic agriculture, as it exists for the 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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