Chapter No. 2

Review of Literature

In order to precede further study, it is essential to take review of studies made earlier relating to organic farming. Few studies have been undertaken in the area of organic farming in India and foreign countries. Brief reviews of few of them are undertaken in this chapter from the following sources.

2.1 Articles published in Journals and newspapers
2.2 Research papers presented in conferences, workshops, seminars and symposium
2.3 Books related to organic farming
2.4 Dissertations and thesis
2.5 Research studies and study reports.

2.1 Articles Published in Journals and News Papers

Ramesh P., Singh Mohan and Subba Rao A.\(^1\) in their article entitled ‘Organic Farming: Its Relevance to the Indian Context’ in current science Journal, Vol.88, have highlighted that the potential environmental benefits of organic production and its compatibility with integrated agricultural approach to rural development, organic agriculture may be considered as a development vehicle for developing countries like India, in particular. The paper considered increasing consciousness about conservation of environment as well as health hazards associated with agrochemicals and consumer preference to safe and hazard-free food are the major factors that lead to growing interest in alternate forms of agriculture in the world. The paper also has discussed certain issues such as; can organic farming produce enough food for everybody? It is possible to meet the nutrient requirements of crop entirely from the organic sources? Is the food produced by organic farming superior in quality? It is economically feasible? Finally, the paper concludes that in India, vast stretches of arable land, which are mainly rain-fed and found in the Northeastern region, where negligible amount of fertilizers and pesticides are being used and have low productivity, could be exploited as potential areas for organic agriculture.

Singh Sukhpal\(^2\) in his article entitled ‘Marketing of Indian Organic Product; Status, Issues and Prospects’, highlighted the rational for organic farming and trade in the problems
of conventional farming and trade practices, both international and domestic, and documents the Indian experience in organic production and trade. It explored the main issues in this sector and discussed strategies for its better performance from a marketing and competitiveness perspective. The paper also observed that organic farm production and trade has emerged as an important sector in India as in other parts of the developing world, and is seen as an important strategy of facilitating sustainable development. This is historic opportunity for the agri-industry to contribute to human progress sustainably as they are best placed to tailor the chain organically.

In the article entitled ‘Nutritional Quality And Safety of Organic Food: A Review’ composed by Denis L., published in Agronomy for Sustainable Development (2009), has focused on major points. viz, 1. Organic plant products contain more dry matter and minerals (Fe, Mg) and contain more anti-oxidants micro nutrients such as phenols and salicylic acid, 2. Organic animal products contain more polyunsaturated fatty acids, 3. Data on carbohydrate, protein and vitamin levels are insufficient documented, 4. 94-100 percent of organic food does not contain any pesticide residues, 5. Organic vegetable contain far less nitrates, about 50 percent less; and 6. Organic cereals contain overall similar levels of mycotoxins as compared that food security, nutritional quality and safety very widely around the world. Reaching these three goals is one of the major challenges for the near future.

At the outset, industrialized production methods have clearly shown sever limitations such as a worldwide contamination of the food chain and water by persistent pesticide residues, and reduced nutrient and flavor contents through low-cost intensive food production and processing. Thus, article concludes that organic agricultural systems have already proved to produce food with high quality standards, and improvements of organic production to achieve sustainable food production for humans in the near future.

Gujral Raman in his article entitled ‘India’s Future Lies in Organic Farming’ published in Science Tech Entrepreneur Journal, in Sept.2006, highlighted on the need and scope for organic farming in India. According to him, India offers tremendous scope for bio-farming as it has local market potential for organic products. Organic food is best for human health but, it is not so easy for the performance-oriented farm sector to revive a conventional practice until it becomes sensitive to the ecological crises ahead. The article also reveals that
increase in fertilizer consumption has significantly contributed to the sustainable production of food grains. Many healthy problems have surfaced in the last three decades, now, the farmers are being persuaded to switch over to the age-old organic farming and thus phase out the consumption of chemical fertilizers. Finally, the article concluded that the organic farming has scope in local and international market potentials for sustainable agricultural development.

In the article entitled ‘Damage Control Inputs: A Comparison of Conventional and Organic Farming Systems’, composed by Zhengfei Gum, Lansink Aflons Oude, Ada Wossink and Huirne Rued, published in European review of Agricultural Economics Journal, Vol. 32 (2), in 2005, highlighted that conventional farms are found to rely substantially on pesticides and machinery for damage abatement. Whereas, organic farming mainly relies on labour use and changes in cultural practices, productivity analysis is based on the asymmetric specification suggests that pesticides are used optimally in conventional farming. This paper proposed a specification that allows for a negative marginal product of pesticides and a damage-abating role for labour and machinery. The economic literature on past control exclusively assumes a non-negative marginal product of pesticides based on a monotonic non-decreasing function of damage abatement, which may bias pesticide productivity estimates.

Milestad Rebeka and Darnhofer Ika in their article entitled ‘Building Farm Resilience: The Prospects and Challenges of Organic Farming’, published in Journal of Sustainable Agriculture, in 2003. Vol. 22(3), have highlighted that the concept of socio-ecological resilience is applied to agricultural system in general and to the farm level in particular-resilience has three defining characteristics: the amount of change the system can undergo, while maintaining its functions and structures, the degree of self-organization and the capacity for learning and adaptation. To assess the resilience of a farming system, various elements that can build resilience are identified. Using these elements, the paper assessed organic agriculture using the IFOAM Basic standards. The analysis shows that organic farming has a number of promising characteristics building resilience. The paper concluded that conversion alone may not be enough to ensure farm resilience. The ability of organic farming to realize its resilience building potential will depend on the ability of organic movement to adopt and learn from the current experiences.
Halberg Niels, Peramaiyan Panneerselvam and Walaga Charles in their article entitled ‘Is Organic Farming an Unjustified Luxury in a World with Too Many Hungry People?’, published in Journal of food security, in 2006, highlighted that in low input areas in Africa and Asia, agro-chemical techniques such as application of compost and other methods of soil improvements and diversity of crop mixtures increase the yields and the stability of yields and overall resistance toward pests and diseases. This again improves the stability of food access for the small holder farmers in times of changing climate including erratic rainfall patterns. Further, the paper proposes potential impacts of large-scale conversion to organic farming on food availability and world market prices at regional and global levels to the year 2020 using IFRI’s IMPACT model. The paper concludes that organic agriculture can contribute significantly to improve food security among small holder farmers in developing countries, and a large scale conversion has the potential to reduce the future dependence of food import in sub Saharan Africa.

Md. Asaduzzaman Sarkar and Yoshihito Itohara in their article entitled, ‘Factors Influencing the Extent of Practice of Organic Farming Technologies: A Case Study of Tangail District In Bangladesh’, published in American Journal of Agricultural and Biological Science, Vol. 3 (3), in 2008, highlighted on the major factors influencing the extent of practice of organic farming technologies by the Bangladeshi farmers. Development of knowledge and awareness regarding environmental issues, creation of health awareness and simplicity of the OFTs and availability of basic production factors as the major influential factors, which can increase the extent of practice of OFTs by the farmers. In this paper the writers suggested that policy makers can formulate a strategy to increase the extent of practice of various OFTs by above factors by farmers for the successful expansion of organic farming in Bangladesh. The authors concluded this paper that above four important factors can significantly influence the extent of practice of OFTs by the farmers in Bangladesh.

that the effects of organic farming on species richness will be longer in intensively managed agricultural landscapes than in small-scale diverse landscapes with many non-crop biotopes. They suggest that positive effects of organic farming on the species richness can be expected in intensively managed agricultural landscapes, but not in small-scale landscapes comprising many other biotopes as well as agricultural fields.

Their Meta analysis supports the notion that a higher diversity and abundance of natural enemies contributes to pest control more rigorously through simultaneous study of the dynamics of pests and natural enemies in different farming systems.

In the article entitled ‘Benefits of Organic Agriculture as a Climate Change Adoption and Mitigation Strategy for Developing Countries’, prepared by Muller Adrian, published in Environment for Development Journal, as an discussion paper, in April 2009, studied that organic agriculture, as an adoption strategy to climate change and variability, is a concrete and promising option for rural communities and has additional potential as a mitigation strategy. This paper also reveals that adoption and mitigation based on organic agriculture can build on well established practice, because organic agriculture is a sustainable livelihood strategy with decades of use in several climate zones and under wide range of specific local conditions. Finally, he has concluded the paper that the financial requirements of organic agriculture as an adoption or mitigation strategy are low. Further, research is needed on yields in organic agriculture and its mitigation and sequestration potential.

In the article entitled, ‘Historical Evolution of Soil Organic Matter Concepts and their Relationship with the Fertility and Sustainability of Cropping System’, composed by Raphael J. Manlay, Christian Feller and M. J. Swift, published in Journal of Agricultural Ecosystem and Environment, (2007), vol. 119, have studied that soil organic matter (SOM) is understood today as the non-living product of the decomposition of plant and animal substances. Because it is now recognized that SOM tightly control many soil prosperities and major biogeochemical cycle, its status is often taken as a strong indicator of fertility and land degradation. They also have considered there historical periods, involving SOM in relation to cropping sustainability can be distinguished as until 1840, from the 1840s to 1940s, and since 1940s to until current period.

They conclude that the interest in SOM over time, both from the view point of scientific concept and that of field practices, can be described by the sine curve and its
functions have gained both much from the combination of holistic and reductionist approaches and from the progressive application of the scale.

Hole D. G., Perkins A. J., Wilson J. D., Alexander I. H., Grice P. V. and Evans A. D.\textsuperscript{12} in their article entitled, ‘Does Organic Farming Benefits Bio Diversity?’, published in the Journal of Biological Conservation, Vol.122, in 2005, have observed that organic farming now seen by many as a potential solution to this contributed loss of biodiversity and received substantial support in the form of subsidy payments through EU and national government legislation. This paper assesses the impact on biodiversity of organic farming, relative to conventional agriculture, through a review of comparative studies of the two systems, in order to determine whether it can deliver on the biodiversity benefits its proponents claim. It identifies a wide range of taxa, including birds and animals, invertebrates and arable flora that benefit from organic management through increases in abundance and species richness. The paper also highlights there broad management practices that are largely intrinsic to organic farming and that are particularly beneficial for farmland wildlife.

David Granatstein\textsuperscript{13} in his article entitled ‘Organic Farming Continues to Expand’ published in the Journal of Agricultural and Environmental News’, Vol. 195, in July 2002, has studied the growth of organic farming in Washington. According to him the demand for organic foods over the country grew steadily during the 1980s and accelerated to a 20-30 percent increase per year, during the 1990s. This market growth was accompanied by an increase in organic farm acreage nationally. Washington State experienced more than a six-fold increase in organic acreage in less than a decade. With expanded production, organic agriculture has moved into the mainstream. Furthermore, he draws attention of future of organic farming will continue to expand, organic food might eventually expand to 10.15 percent of total food sales. He concluded that, organic farming, whatever it evolves into, will likely influence agriculture in our state for years to come and may offer Washington agriculture a measure of increased sustainability, both environmentally and economically.

vegetable intake and calculated it for both organic and conventional diet. The paper proposes that organic crops contained significantly more vitamin C, iron, magnesium and phosphorus and significantly less nitrates than conventional crops. There were no significant trends showing less portion of better quality and a higher content of nutritionally significant minerals with lower amounts of some heavy metals in organic crops as compared to conventional ones. He concluded his paper that here appears to be genuine differences in the nutrient content of organic and conventional crops.

Gupta Vedakattu and Louise Lawerence\textsuperscript{15} in their article entitled, ‘The Health of Soils in Organic Farming Systems’, published in Farming Ahead Journal, no. 207, in April 2007, highlighted that the availability of nutrients, cultivation and the presence of agrochemicals are some of the factor that can influence the metabolic status of soil microorganisms. Researchers analyzed the biological status of organic soils and linked this information to functions necessary for plant growth and performance, to measure the efficiency of the organic soils. The paper clearly shows the results that an enhanced soil microbial community and biological progress, relative to conventional systems, might not be a definite feature of all broad acre organic system. Finally the researchers concluded that, it is important to remember that soil type and environmental variety had a considerable effect on the soil biological status in organic farming system.

In the article entitled, ‘Long-Term Effects of Organic and Conventional Farming on Soil Erosion’, prepared by Reganold John, P. Elliott, Lloyd F. and Yvonne L. Unger\textsuperscript{16}, published in the Journal of Nature, vol. 330, in Nov. 1987, have compared the long-term effects of organic and conventional farming on selected properties of the same soil. The organically-farmed soil had significantly higher organic matter content, thicker topsoil dept, higher polysaccharide content, lower modulus of rupture and less soil erosion than the conventionally farmed soil. This paper proposes that conventional, intensive tillage farming systems have greatly increased crop production and labour efficiency. Finally, the researchers concluded that in long term, the organic farming system was more effective than the conventional farming system in reducing soil erosion and, therefore, in maintaining soil productivity.

Alice Beban\textsuperscript{17} in his article entitled ‘Reclaiming Human Rights: The Right to Food and the Role of Organic Agriculture’ has observed that in the face of the increasing
corporatization of food and property and the de-politicization of hunger, it is doubtful in some contexts that a reliance on the state is the best solution to securing food rights. New perspectives on food rights recognize the role that rural food producers around the world, who ironically often face some of the greatest barriers to achieve food security, are playing in securing their rights to food. The researcher also purposes that worldwide, food producers are embracing various forms of sustainable production methods such as organic farming, alternative marketing channels and solidarity networks, and thereby gaining control over how and what they produce. These struggles create both a challenge to the conventional food system and a creative solution to hunger and its consequences.

In the article entitled ‘Organic Farming for Sustainable Agriculture and Meeting the Challenges of Food Security in 21st Century: An Economic Analysis’ prepared by Thakur D. S. and Sharma K. D., published in Indian Journal of Agricultural Economics, Vol-60 (2), in April-June, 2005, evaluated that the comparative economics of OFS vis-à-vis IFS is clearly in favor of OFS, which is also necessary for sustainable agriculture. The yield and production of crops increase under OFS, whereas the same decelerate under IFS in the long run. The costs of production of crops per hectare and per quintal under OFS are lower than under IFS. Gross and net incomes are nearly 2 to 3 times higher under OFS. Overall, OFS produces more and sustainable agricultural output with less energy, low cost and fewer resources.

Moreover, the article also proposes that OFS has proved to be an effective cure for the ills and problems of IFS as it puts life into the soil through the addition of organic manure and promoting the activities of soil micro-organisms, improves soil structure, soil health and soil productivity to increase yields, production, income and profits of crops on sustainable basis.

Bhattacharyya P. and Chakraborty G. in their article entitled ‘Current Status of Organic Farming in India and other Countries’, published in Indian Journal of Fertilizers, Vol. 1 (9), in Dec 2005, studied that organic farming is being practiced in 100 countries of the world. The ill effects of chemicals used in agriculture have changed the mind set of some consumers of different countries, who are now buying organic with high premium for health. Policy makers are also promoting organic farming for restoration of soil health, and generation of rural economy apart from making efforts for creating better environment. The
article also reveals that the global organic area is 26 million hectare roughly along with 61
standards and 364 certification bodies roughly. India has developed National Standard under
NPOP programme. The National Centre of Organic Farming under Ministry of Agriculture
is promoting organic farming as facilitator across the country and providing various
assistance to organic entrepreneurs and farmers.

Rupela O. P., Humayun P., Venkateswarlu B. and Yadav A. K.20 in their article
entitled ‘Comparing Conventional and Organic Farming Crop Production System: Inputs,
Minimal Treatments and Data Needs’ published in the Journal of Organic Farming
Newsletter, in 2006, studied that residues of synthetic pesticides food chain promoted the
demand for organic food, which is rapidly growing. Certified organic food is presently
grown on about 31 million hectare in the world (1.1 million hectare in India). It is revealed
that reduced cost of production was stronger for their conversion from conventional
agriculture of organic farming. In addition, the yields of organic farming were not lower
than the yield of their neighbors who are conventional farmers. The paper also draws
attention towards the fact that nutrients needed for a crop can be met through plant biomass
grown at the same field and the plant biomass grown at met through innovative biological
option are also important researchable issues, among several others. The researchers
conclude this paper that organic farming system seems pro small and marginal farmers that
are majority in India needs appropriate evaluations by the mainstream science.

In the article entitled ‘Crop-Use Efficiency of Nitrogen from Manures Permitted in
Organic Farming’ composed by M. A. Rodrigues, A. Pereira, J. E. Cabanas, L. Dias, J.
Pires and M. Arrobas21 published in European Journal of Agronomy, Vol-25, in 2006,
highlighted on the comparison the performances of vegethumus (veg) and phenix (phe), two
manures that are permitted in organic farming with several other manures, ammonium
nitrate (AN) and control treatments. The paper also proposes that a 3-year field trial and a
pot experiment were carried out in order to estimate dry matter yield, N uptake and N
nutritional status of the crops, as well as soil N availability, the latter was assessed by using
union exchange membranes inserted into soil. Apparent N recovery (ANR) values in the
field trial were 6.3 percent in veg and AN plots, respectively, after the application of 380 kg
N/ha in the previous five growing seasons. In the pot experiments, the ANR of veg and Phe,
the organic amendments permitted in organic farming, were 5.0 percent and 13.6 percent,
while Beiraadubo (Bei) and Nutrisoil (Nut) had ANR of 27.2 percent and 42.0 percent. The poor results of the amendments permitted in organic farming, in light of their high prices suggest that their use must be carefully considered by farmers in their fertilization strategies.

Sharma K. Arun in his article entitled ‘The Potential of Organic Farming in the Dry Lands of India’ published in the Journal of Arid Lands News Latter, Vol.58, in 2005, draw attention to immense possibilities for improving the soil health and overall environmental, and providing sustainable livelihoods in these areas, by adapting these age-old system with modern research and techniques. The key to achieving this is enhanced collaboration and co-operation among all the agencies and programs that have an interest in supporting these goals. By working together, the goals of promoting organic practices, improving soil health and local food security and ultimately creating markets for organic products both regionally and, globally, can be realized for the benefits of India.

Finally, the researcher concluded that organic agriculture is a holistic system that focused on improvement of soil health, use of local inputs, and high-intensity use of local labour, is an admirable fit for dry lands in many ways, and the dry lands offer many benefits that would make it relatively easy to implement.

Eva Erhart and Wilfried Hartl in their article entitled, ‘Soil Protection Through Organic Farming: A Review’, evaluated that whether or not organic farming might be a way to maintain and restore soil quality. Research of field experiment and studies of practical farms show concordantly that soil organic matter typically increases or is conserved better with organic than with conventional farming practices. Soil organic carbon was 6.34 percent higher under organic than under conventional management, with two studies finding no pronounced differences and two studies with very old organic farms exhibiting 50-70 percent more soil organic C than their conventional neighbors. This goes along with an increase in soil total nitrogen content of up to 21 percent, which nevertheless was shown not to lead to increased nitrogen losses to the groundwater due to nitrogen-conserving practices used in organic farming. The paper also draws attention that soil structure is typically positively affected by organic farming practices.

Mark W. Rosegrant, Timothy B. Sulser and Niels Halberg in their article entitled ‘Organic Agriculture and Food Security’ observed that the impacts of organic farming production upscaled to regional and global levels and it gives an initial quantification of the
potential extent of changes that large-scale conversion might induce. Their paper also reveals that optimistic estimates of change with respect to organic yield potential lead to modest impacts on global commodity prices, production and trade conversion in high-input regions in Europe and North America to certified organic decreases production and increases commodity prices. Hunger in this scenario slightly worsens. Transition of low-input areas in Sub-Saharan Africa to non-certified organic lead to increased production and decreased production. Food security improves slightly in this scenario. This paper also proposed that the switch for low-input regions helps decrease trade dependency in some commodities. Achievement of productivity level in these scenarios is dependent on many factors that introduce a significant amount of uncertainty in the results. The researchers also suggest that the extent of these impacts can be improved if concerned effort in research and development for yield and productivity enhancement is supported.

In the article entitled ‘Crop Rotations on Organic Farms’ composed by Keith R. Baldwin\textsuperscript{25}, has highlighted on historical perspective of crop rotations V/s continuous cropping, crop rotations and soil fertility and crop rotation and pest management etc. He summarized the results of several scientific studies that have compared the impacts of long and short-term rotations and continuous cropping or monoculture, on soil properties. Crop rotations can lead to dramatic increase in soil fertility, help to optimize nutrient and water used by crops, and improve the soil resources. The paper also proposes that the use of two and three year rotations by the majority of the grain farmers in this country shows that the yields are generally higher, when crops are grown sequentially in rotations. Finally, he has concluded in his paper that crop rotations are key strategies that farmers can use to build the soil, manage pest and increase yields.

Dr. B. Venkateswarlu\textsuperscript{26} in his article entitled ‘Organic Farming in Rainfed Agriculture: Opportunities and Constraints’ highlight on opportunities of organic farming in rain fed agriculture and constraints for organic farming in rain fed agriculture. His paper explores that rain fed areas are reported to have relative advantage to go for organic farming primarily due to i) low level of input use, ii) shorter conversion period and iii) smaller yield reductions compared to irrigated areas. However, the inherent advantages of organic farming in rain fed areas are price advantage, export potential with price premium, minimum cost, higher yields and soil fertility and qualitative product etc.
However, the rain fed agriculture has some constraints for adoption of organic farming such as the availability of FYM and other organic forms of nutrients in desired quantities, water availability and yield declines during conversion period, limited biomass and organic resources etc. He concludes his paper that even though, there are various limitations for organic farming in rain fed regions rain fed regions undoubtedly offer good scope for organic production at least in niche areas and commodities. A number of research, development and policy issues need to be addressed before realizing the potential.

Christos Vasilikiotis in his article entitled ‘Can Organic Farming Feed the World?’ draw attention on current world population and available food. According to him, our current world food production is more than sufficient to provide an adequate diet to all humans, yet more than 840 million people are suffering from hunger. The question then, is not “how to feed the world”, but rather how can we develop sustainable farming methods that have the potential to help the world feed and sustain itself. His paper also proposed that organic farming system have proven that they can prevent crop loss to pests without any synthetic pesticides. They are able to maintain high yields, when compared to conventional agriculture without any of the associated external costs to society. Furthermore, organic and agro ecological farming methods continually increase soil fertility and prevent loss of topsoil to erosion, while conventional methods have the opposite effect. The researcher conclude that only organic methods can help small family farms survive, increase farm productivity, repair decades of environmental damage and knit communities into smaller and more sustainable distribution networks- all leading to improved food security around the world.

In the article entitled ‘Impact of Organic Farming on Economics of Sugarcane Cultivation in Maharashtra’ prepared by K. G. Kshirsagar, proposed that organic sugarcane cultivation enhances human labor employment by 16.90 percent and its cost of cultivation is also lower by 14.24 percent than inorganic sugarcane farming. Although the yield from organic sugarcane is 6.79 percent lower than conventional crop, it is more than compensated by price premium received and yield stability observed on organic sugarcane farming. The organic sugarcane farming gives 15.63 percent higher profits and profits are also more stable on organic sugarcane farms than the inorganic sugarcane farms.
John P. Reganold in his article entitled, ‘Soil Quality and Profitability of Biodynamic and Conventional Farming Systems: A Review’ studied that Biodynamic and organic farming are similar in that both are ecologically oriented and do not use chemical fertilizers and pesticides. The main difference is the biodynamic farmers add eight specific amendments, called preparations, to their soils, crops, and composts. This paper summaries data from previous studies both published and unpublished that have compared biodynamic and conventional farming systems with respect to soil quality or profitability. These studies have shown that the biodynamic farming system generally have better soil quality, lower crop yields and higher net returns per hectare than their conventional counterparts. However, the researcher has suggested that more research is needed to determine whether the preparations affect soil and physical, chemical and biological properties and crop growth and if so their mode of action.

Inder Bir Singh in his article entitled ‘Sustainable Agriculture Through Organic Farming’ published in the Journal of NCDC, Bulletin, observed that the green revolution fulfilled our aspirations by changing India from a importing country to a good exporting nation. However, this achievement was at the expense of ecology and environment and to the detriment of well being of the people. The agriculture system adopted by India from the west has started increasing unsustainability and once again there is a need felt for alternative agricultural practice that is both eco-friendly and most appropriate for production of healthy foods. The paper also proposes that organic farming aims at the human welfare without any harm to the environment as compared to the conventional methods of chemical farming. The paper reveals that the negative effects of chemical farming system were first experienced by western countries. Besides, it has several advantages over the conventional methods for protection of both the environment and human health.

Watharkar Pandurang in his article entitled ‘Mahaorganic’, which has been published in Loksatta daily newspaper dated on 14th Dec, 2009, highlighted the need of organic farming, world scenario of organic farming, organic farming in India and Maharashtra, various methods in organic farming, certification of organic farming, and role of State Government for organic farming. The researcher proposed that 12 lakh hectare lands were under certification in India in last year. Whereas, 2.77 lakh hectare land was under certification in Maharashtra in last year. In Maharashtra, around 6.50 lakh hectare
land was under organic farming. The researcher reveals that organic farming is being undertaken in 130 countries in the world and more than 10 lakh farmers are working in organic farming in world. Organic farming is being cultivating around 12.4 million hectare in Australia, which the largest area of organic farming in the world. This paper also explores that central and state governments also encourage to organic farming through various subsidy, training, financial assistance etc., to farmers.

2.2 Research Papers Presented in Seminars, Workshops, Conferences and Symposium

Sadanandan A. K., Hamza S.\textsuperscript{32} in their paper entitled ‘Effect of Organic Farming on Yield and Quality of Spices in India’, presented by poster in symposium explained that the effect of organic farming on soil quality, spices productivity and quality attributes of spices together with factors controlling the levels of organic matters in soils. Application of organics improves the organic matter status, water holding and exchange capacity of soils. This paper also draws attention that the organic matter is correlated with water holding and exchange capacity of the soil. The physical, chemical and biological properties of soil were enhanced by the integrated nutrient management with the use of organic and inorganic fertilizers with least hazard to environment.

The research paper entitled ‘Impact of Organic Farming on Yield and Quality of BASMATI Rice and Soil Properties’, prepared by Y. V. Singh, B. V. Singh, S. Pabbi and P. K. Singh\textsuperscript{33} revealed that a significant enhancement in grain yield of rice over absolute control due to the application of different organic amendments applied alone or in combinations. An interesting observation was recorded that there was no serious attack of any insect pest or disease in crops grown organically. They concluded their paper that use of different organic amendments viz. Blue Green Algae, Azolla, Vermi compost and farm yard manure in a cumulative manner can meet the nutrient requirement of organic scented rice in rice-wheat –green gram cropping system. Organic farming enhanced soil organic carbon, available phosphorus content and microbial population or enzymatic activity of soil thus making it sustainable for organic crop production. Increase in Fe and Mn content in rice grain further indicated that their use not only maintains the soil productivity, but also improves the grain quality.
Lukas M. and Cohn M. in their research paper entitled, ‘Organic Agriculture and Rural Livelihoods in Karnataka, India’ presented in IFOAM organic world congress, Modena, Italy, 16-20 June, 2008, explored the effects of the change from conventional to organic farming had an the livelihoods of a group of farmers in Karnataka, South India. The farmers in the case study revealed that their livelihoods had improved over the long term by the conversion from conventional to organic farming. It reduced costs for external inputs and reduced labour requirements together with similar or higher yields and premium prices resulted in higher net –farm incomes. The researchers also explain that the conversion to organic farming reduced the reliance on credits and the risk of crop failure due to pests, diseases and droughts, thereby reducing vulnerability. However, almost all the case study farmers noted that the conversion period was difficult due to temporarily declining yields and a lack of information and experience. This is likely to be a major constraint preventing asset-poor farmers from adopting organic agriculture.

In the research paper entitled ‘Food Security and Sustainable Production Systems in India: Implications under Trade Liberalization’ prepared by Amit Shah and Gary Van Loon, presented the study of organic farming and the focus of this study on India’s agricultural trade policy and its relation to food production in the country and economic decisions regarding procurement pricing and the public distribution system, all of which eventually affect the food security of the poor. The research have considered another issue that is an assessment of the scope form promoting sustainable agriculture, including organic farming and its feasibility for ensuring aggregate food supply growth in export and institutional development. The study is directly focused on exploring new avenues for sustainable agriculture through changes in domestic and trade policies in India.

Bhatta Gopal Datta, Werner Doppler and Bahadur Krishna K. C. in their research paper entitled ‘Problems and Potentials of Organic Agriculture Development in Nepal’ presented in conference on International research on food security, natural resource management and rural development at University of Hohenheim, 7-9 October, 2008, focused on problems and potentials of organic agriculture in Nepal based on the study of Stakeholders of organic agriculture. There has been lacuna in research on the technologies to support organic agriculture. However, marketing for such products is the greatest bottleneck. The paper also proposes that consumers have a belief that organic food is healthier, less
polluted and more natural than conventionally produced food. Many of the consumers are of the view that quality of the organic products is good and that’s why these products are expensive.

This paper also explores that there is a vacuum of government policy to support organic opportunities in the country. Political commitments such as avoiding conflicting drive to maximize production, hammering proactive policy, providing market incentives and institutionalization of Nepalese organic movement are imperative to further enhance organic sector in Nepal.

Holger Kirchmann and Megan H. Ryan in their research paper entitled ‘Nutrients in Organic Farming - Are there Advantages from the Exclusive Use of Organic Manures and Untreated Minerals?’ presented at 4th International Crop Science Congress, 26 Sep- 1 Oct 2004, Brisbane Australia, examined the implications of organic farming fertilizer practices for the sustainability of farming systems using two contrasting regions, viz., Europe and Australia. Nutrient inputs are lower on organic farms, although in Europe there is a tendency on organic farms for increased application of purchased, approved, nutrient sources other than fodder. In conclusion, the current promotion of organic principles irrespective of environmental outcomes means organic farming has become an aim in itself. This approach is ideological, not scientific and may exclude more other effective solution to the environmental problem afflicting the current agricultural systems.

W.J. Nauta, H. Saatkamp, T. Baars and D. Roep in their research paper entitled ‘Breeding in Organic Farming: Different Strategies, Different Demands’ studied that due to regulations organic farming is subjected to a different regime than conventional farming. This results in different environments for animals. The question is whether one overall breeding goal is sufficient to cover all different demands of organic farmers. This paper also proposes that in general farmers valued different aspects more or less the same: they wanted a robust, long living cow, with good udder health and fertility. However, farmers wanted to achieve this goal in many different ways. The researchers have concluded that farmers are active searching for the best type of cow for their farms. The difference in the use and land crossing of different breeds questions the overall breeding goal. Other aspects of breeding become important in organic farming, like the breed itself.
The research paper entitled ‘The “Trap Of Conventionalization”: Organic Farming Between Vision and Reality’, prepared by Ruth Kratochvil and Heidrun Leitner\(^9\) for the XXI congress of the ESRS on 22-27 August, 2005 keszthely, Hungary on ‘continuity and change in organic farming – philosophy, practice and policy’, proposed the aim of this paper to bring out the symposiums results, structured alongside the stages of the organic product chain, and relate them to the current scientific literature on conventionalization of organic farming. The researchers made observations quite accurately that the arguments introduced by the scientific literature: in the participants view as well as in scientific thoughts the regional context seems to be of special importance to overcome the trap of conventionalization. The researchers also concluded that to enable organic farming to keep its environmental, social and economic advantages and sustain its development, it is necessary to improve several factors not only concerning the organic farming system, but also society as a whole.

The research paper entitled, ‘How Do Farmers Research and Learn? The Example of Organic Farmers Experiments and Innovations: A Research Concept’ prepared and presented by Kummer S., Ninio R., Leitgeb F. and vogl C. \(^{40}\) at 16th IFOAM organic world congress Madena, Italy, June 16-20, 2008, proposed that experimenting, adopting and innovating are central features of farmers activities all over the world. Farmers have an intimate knowledge of their local environment, conditions, problems, priorities and criteria for evaluation and they are actively engaged in experimentation as a part of their farming routine. The development of organic farming systems is continually evolving through the experiments and innovations of organic farmers. Organic farmers themselves have been responsible for most of the advances and innovations in organic farming and have always researched topics pertinent to their production system. A current research project investigates learning processes of organic farmers in Austria, Cuba and Israel through researching the multifaceted experiments they conduct and the innovations they obtain as possible results.

The research paper entitled ‘Financing Organic Agriculture: Options and Prospects’ prepare and presented by E. V. Murray\(^{41}\) at National Seminar on Organic Agriculture held on 20-21 November, 2006 at Kochi studied that Organic agriculture is growing from a movement among a small group of elite farmers into a mainstream activity that benefits a
large number of farmers, especially small farmers. As this happens, promoted by promotion of organic agriculture, there will be an increasing need for resource transfers to the secondary increasing need for resources transfers to the secondary and territory sector. The researcher concluded the paper that financing organic agriculture is, thus going to be a challenge for bankers and would be different from financing inorganic or traditional agriculture. Being more stable than conventional agriculture, it makes eminent sense financing organic agriculture. Bankers will increasingly be also called upon to come in and play a role even before financing, in promoting, popularizing and developing cultivation standards and practices.

The research paper entitled ‘Organic Farming as a Tool for Productivity and Poverty Reduction in India’ prepared and presented by Daniele Giovannucci at International Fund for Agricultural Development / NACF Conference Seoul, 13-16 March, 2007, is based on recent developments and also primarily on an IFAD evaluation of small farmer experiences of organic project under different condition in Asia. It briefly reviewed key issues ranging from the adequacy of fertilizers, labour and plant protection to important considerations about certification and marketing. It finds significant evidence that organic methods could be favorable for small farmers, but that the immediate impact on the farmer differs depending on the organizational support available and weather the farmer transitions to organics from traditional low- input methods and more intensive methods of production. Some of the related externalities, including resource conservation and soil fertility, may be even more valuable in the long run. Evidence also indicates that the organic supply chains of processing and trade also earn more money.

Artur Granstedt and Lars Kjellenberg in their research paper entitled ‘Long Term Field Experiment in Sweden: Effects of Organic and Inorganic Fertilizers on Soil Fertility and Crop Quality’ presented at International Conference on ‘Agricultural Production and Nutrition’ at Tufts University, Massachusetts, Boston, On 19-21 March, 1997, compared between two systems, biodynamic farming and conventional farming, in which both fertilizer regimes and crop rotations were studied.

The paper has concluded that the organic treatments resulted in a higher soil fertility capacity and in crops with higher quality protein, higher starch content and a greater ability to tolerate stressful conditions and long term storage in comparison with the inorganic
treatments. Furthermore, the crops produced in the organic treatments developed a structure that can be studied through a picture formation method. This has also been described as a higher organizational level, which is evident in terms of both soil and crop formation as a result of the long term effect organic manure compared with conventional NPK-fertilizer.

The research paper entitled ‘Organic Farming’s Contribution to Climate Change and Agricultural Sustainability’ prepared by Dr. Nic Lampkin, studied that organic farming, by using less fossil energy and building soil organic carbon levels can make a direct contribution to mitigating climate change. It is important to acknowledge that many of the environmental and sustainability benefits that organic farming delivers may be an indirect result of the standards, rather than specifically provided by them.

The researcher has concluded this paper that resource use self-sufficiency is a key organic principle, and nitrogen self-sufficiency is part of organic standards. Should energy used self-sufficiency and carbon-neutrality be given similar status? What is the role of renewable energies and organic biomass/fuels production in this context? What scope is there to improve everyday practices? It is also important to consider the whole food system including processing, packaging, distribution, retaining and consumption.

Katharina Niemeyer and Dr. Jan Lombard in their research paper entitled ‘Identifying Problems and Potential of the Conversion to Organic Farming in South Africa’, which was presented at the 41st annual conference of the Agricultural Economic Association of South Africa (AEASA), 2-3 Oct., 2003, Pretoria, South Africa, they studied that the world-wide trend of a growing organic sector is also detectable in South Africa. From 2000 to 2002 the number of farmers who had converted to organic farming in South Africa increased six fold, and although organic farming still accounts only for a minute percentage of the total number agricultural producers, the increasing importance of this sector is apparent.

The researchers recommended that the conversion to organic farming should be supported, not necessarily via direct financial support to the organic farmers, but by means of different instruments such as the development of an improved infrastructure for marketing, networking and information exchange. Several areas for future research are identified to increase our understanding of organic farming in the South African context.
The research paper entitled ‘Proposed Global Co2 Project: Organic Agriculture and Its Importance in the Mitigation of Climate Change’ prepared by Salvodar V. Garibay, presented at workshop on climate change and organic farming, 17 February 2007, Biofach Congress Nurnberg Messe Room, Shanghai, proposed that the organic agriculture compared to others has clear advantages with respect to climate change and the protection of environment. Organic management practices save the energy and build up fertility that may render the system less vulnerable, so payments and support for these benefits are justified and on these grounds farmers will be motivated for additional environmental services.

This paper also draws attention that the proposed “Global Co2- Project” aims to initiate a process of understanding and co-operation on organic agriculture and its importance in the mitigation of climate change. It is important to build a global platform, where the participants jointly analyse their result, exchange their experiences, discuss future perspectives, and cooperate on how organic agriculture can be positioned scientifically, politically and within civil society as a real option to mitigate the climate change.

Zundel, Cristine, Lukas Kilcher and Paul Mader in their research paper entitled ‘What Can Organic Agriculture Contribute to Sustainable Development?- Long-Term Farming System Comparisons in the Tropics’, ‘Presented at conference on International Agricultural Research for Development organized by University of Kassel- Witzenhausen and University of Gottingen, 9-11 October, 2007, studied that organic agriculture is a option that interests agricultural Stakeholders, because it combines environmental conservation with low cost technology and across to premium price markets. The organic farming system has proven its advantages in terms of resource efficiency, ecosystem functioning, soil fertility conservation and economic impact in a wide range of experiments and studies in the developed countries of the tropics, meanwhile, NGOs and farmers group are now increasingly adopting organic techniques as a means of improving productivity and food security. This paper also reveals that the Research Institute of Organic Farming, together with its partners, is presently establishing long-term comparisons of organic farming systems in various agro-ecological and agro-economic contexts to study the different parameters that are essential for sustainable development.

In the research paper entitled ‘Could Organic Food Feed the Planet?’ prepared and presented by Anne Arponen at bright conference in Milano 2009, focused on...
environmental sustainability, social sustainability, economic sustainability etc. The research paper reveals that organic farming fulfils all three levels of sustainable development. Environmental sustainability results from improved soil condition enhanced soil fertility, more efficient utilization of resources and enhanced floral and faunal diversity. Social sustainability, on its behalf, is due to the fact that organic farming could produce enough food on a global per capita basis to sustain the current and even bigger population. What is most notable is that organic methods have produced the biggest yields in developing countries and thus could improve total food supply in countries that are most urgently in need of food security. In addition, this paper also assess that economic sustainability results from better farm profitability on organic farms as on conventional farms, which is due to higher market prices, price premiums, lower input prices and predominantly lower costs. The researcher concluded that organic farming method achieves the environmental, social and economical sustainability and organic farming (food) feed the planet and could achieve the global food security.

Urs Niggli in her research paper entitled ‘Food and Drink Challenge Sustainability!’ presented at conference on ‘Time for action- Towards sustainable consumption and production in Europe’, Sept, 2007, 27 to 29, Liubljana, studied that the development, sales, per capita consumption of organic production, market shares are increasing rapidly in Europe. The researcher also considered the challenges before the current farming system, which includes sustainable land or soil use, water scarcity, biodiversity losses, emission and stock of soil carbon and increased competition for food. She also studied the benefits of organic farming with regarding to economic and environmental aspects with compare to conventional farming.

The researcher concluded some factors they are 1) Sustainability: Huge gap between scientific evidence and political action/ farming practices. 2) Organic farming: easy to learn and easy to control approach to a sustainable agriculture. 3) Potential of organic farming underestimated / not yet exploited. 4) Low-input farming and organic farming should co-operate on key areas. 5) Sustainability and high productivity: a contraction? Finally, she suggests that need of an ecological intensification with a low external input approach.

In the research paper entitled ‘The European Action Plan for Organic Food and Farming-Do We Need New Approaches to Organic Farming Policy?’, prepared by Stephan
Dabbert and Christian Eichert for the conference on ‘Biological Farming Approach 2008’ 01st Feb, 2008 at Nuremberg. This paper also had drawn attention on organic farming policy. It has become more important because of environmental aspect; especially it has given the contribution to climate change mitigation. Organic farming has increased the agricultural support and agricultural productivity.

The researcher explored this paper that quality assurance will stay high on the agenda for organic farming. Progress in informality technology opens up new paths for quality assurance and efficient and reliable certification systems. This needs more exploration. Productivity is becoming more important, RTD for increasing productivity of organic farming is even more important than in the past.

In the research paper entitled ‘Research, Innovation and Technology Transfer Priorities in Organic Agriculture’ prepared and presented by the Research priorities working group at Quebec, May 2006, studied that the organic agriculture sector makes up approximately 2 percent of the total food market in Quebec. With an overall rate of growth of 15 percent per year, the organic sector is one of the sectors, if not the sector, which has experienced the strongest growth in the agro-food industry. However, productivity is significantly lagging behind both the demand of consumers and the requirements of processors. There is an important potential for development in this agri-food sector. The committee also observes that there are currently not enough certified companies and companies in transition to meet the demand. For this reason, vast majority of organic food consumed in Quebec are imported. It is therefore necessary to increase the number of Quebec organic products available both for our own market and for export.

Sue Edwards in his research paper entitled ‘Role of Organic Agriculture in Preventing and Reversing Land Degradation’, studied the reasons of land degradation and also observers that organic farming prevents land degradation because it avoids the shifting of cultivation and reduces the consumption of fossil fuel. The researcher concludes his paper that soil erosion and desertification are the physical expressions of land degradation, while the social and economic impacts are degraded lifestyles and pernicious poverty. An understanding of how to maintain healthy soil is essential to reverse and prevent land degradation. Healthy soil carries a good plant cover and enables rain water to infiltrate and recharge both soil water and underlying aquifers.
David Younie in his research paper entitled, ‘Perspectives of Organic Farming and Livestock Production in EU’, has highlighted on principle and legal definition of organic farming, characteristic of organic livestock production and organic livestock production in Europe. The paper also discusses the features of organic livestock production. This paper also studied the development of organic farming in Europe.

The researcher has derived some conclusions which includes. 1) Organic farming based on a set of principles. 2) Focus on naturalness and harmony, 3) Legal framework in place, 4) Large variations in size of organic farming sector in different countries. 5) Market still growing but more slowly, 6) Organic livestock production is more technically challenging and more market potential.

Panneer Selvam in his article entitled ‘Food Security of Small Holding Farmers in Relation to Organic Farming in India’ has studied that food insecurity existed not because of insufficient food production, but because of lack of access and entitlement to food. This paper also reveals that organic farming reduces input cost and borrowing from money lenders. In enhances the livelihood of small and marginal farmers. The researcher has concluded this paper that organic farming seems to be a viable option to improve food security of small holding farms by increasing income and decreasing input cost, producing more for home consumption and adopting ecologically sustainable practices with locally available sources.

In the research paper entitled ‘Potentials of Organic Farming to Alleviate Poverty in Pakistan’, prepared and presented by Prof. Dr. Abdulrauf Faroogi, has focused on economic and environment benefits and potentials of organic farming in Pakistan. According to him, organic food tends to have higher levels of 21 nutrients as compared to conventional produce including vitamin C (27 percent more), Mg (29 percent more), Fe (21 percent more) and 14 percent more phosphorus. It uses environmental friendly inputs and therefore positively contributes to marked reduction in air, soil and ground water pollution. Moreover, organic farming saves environment from harmful effects of the use of synthetic inputs, which releases harmful toxic chemicals in water and soil. Further, through marketing of organic product in high value Niche Market, farmers can earn huge foreign exchange and poverty can be removed from Pakistan through large scale employment in organic farming. Finally, the researcher discussed the potential for organic farming in Pakistan.
2.3 Books Related to Organic Farming

The book entitled, ‘Organic Farming for Sustainable Horticulture: Principles and Practices’, by P. Parvatha Reddy (2008), is the combination of principles and practices of organic farming in Horticulture crops. Hence, this book is an attempt, which comprehensively deals with both principle and practices. The book is divided in two parts. The first part deals with principles of organic farming covering aspect such as enrichment of soil with organic matter, cropping systems, bio-fertilizers, weed management and pest management. The second part of the book deals with package of practices for organic farming in fruits, vegetables, ornamentals, medicinal and aromatic, plantation, spices and tuber crops. Three aspects, namely nutrient management, weed management and pest management are dealt with separately for each crop. An entire chapter is devoted for sources of critical inputs used for organic farming, which would be very much useful to the organic farmers to obtain the same. This book is a practical guide to practicing organic farmers of horticultural crops.

Trivedi Pravin Chandra in his book entitled, ‘Organic Farming and Mycorrhizae in Agriculture’, has edited this book, which provided an authoritative review account of many aspects of current interest, and progress in this field that has been made in the recent years. Major sectors include articles on the prospects and applications of organic farming; composting technology for organic farming; potentiality of biofertilisers and organic farming in the bast fibre crops; role of organic farming in sustainable agriculture; PGPR bioinoculant as input in organic farming; Azolla for sustainable crop production. Topics on mycorrhizae include articles on mass multiplication of G. Fasciculatum; VAM biotechnology; current trends and future prospects; VAM – a review; mycorrhiral fungi- a boon for sustainable agriculture; association of AM fungi in some medicinal plants and their influence on growth, mycorrhiral association in pteridophytes; management of AM- fungi in peanut, impact of conventional agricultural practice; and agrochemicals on arbuscular mycorrhizae in agricultural field. Articles related to agriculture are: a study of economics of bio-inputs usage in agriculture; strategy for the development of dry land agriculture; agricultural bio-diversity and its potential use in India; and bio-pesticides and their importance sustainable agriculture.
Jackson G. J.\textsuperscript{58} in his book entitled, 'Organic Cotton Farming in Kutch, Gujarat, India.' (2005), has shown actual scenario of organic cotton in Kutch Gujarat. He has composed eight chapters in his book. First four chapters are giving the general information about organic cotton and other varieties of cotton. Which have included the present status of organic farming, area of cotton, cotton varieties, general cotton farming practices, fertilization practices, crop protection etc. Chapter no. 5, 6, 7 and 8 are related to practices of organic cotton farming and discussion and conclusions. Chapter No.5 is related to practices of organic farming, which includes varieties of crops grown, land preparation and sowing practices, crop rotation, mixed cropping and Intercropping, fertilization practices, crop protection, seed treatment, weed control, insect and mite control, harvesting and case examples etc. Whereas, remaining chapters include organic cotton farming results, discussion and conclusions. Finally, the author of this book concludes that the Kutch organic yields are so high compared to systems, where synthetic fertilizers and pesticides are used. However, the probable factors are the low pest populations due to the dry climate and due to the widespread use of Desi varieties, great attention is paid to soil fertility, and improved farmer awareness of good crop husbandry.

In the book entitled ‘A Contribution to Sustainable Poverty Alleviation in Developing Countries?’ (2005) composed by Julia Johannsen, Brigit Wilhelm, Rudolf Buntrel-Cano, Florian Schone and Martina Fleckenstein\textsuperscript{59}, published by German NGO Forum Environment and Development, studied that how the organic farming gives the contribution for the development of common man in developing countries. This book includes 17 chapters. In 1\textsuperscript{st} and 2\textsuperscript{nd} chapter, the term of organic farming and various approaches for sustainable development in global agriculture have been discussed. What role does farming play for poor? What prospects does organic farming hold for the poor? Problems which occur in organic farming system? And what sort of agriculture extension services benefits the poor etc., are discussed in chapter No. 3, 4, 5, and 6. Chapter No. 7,8,9,10,11 and 12 discuss the contents, which improved cultivation methods reduce poverty? Does an organic method mean accepting lower yields? Certification and standardization, how can local organic movement benefit from the development of International organic markets? Impacts of development of standards on farmers and how much organic farming does rely on exports in the South etc.
Development of local organic markets and exports, export oriented organic production in developing countries, organic products traded under fair conditions, contribution of organic farming to the protection of the environment and agro-biodiversity and co-operation between environmental development and organic farming organizations etc., these topics are discussed in remaining part of this book. Finally, this book concludes that the organic farming system gives the contribution to alleviate the poverty of the poor farmers and to help sustainable development and environmentally sound agriculture.

David Crucefix in his book entitled, ‘Organic Agriculture and Sustainable Rural Livelihoods In Developing Countries’ (1998) commissioned by the National Resources and Ethical Trade Programme managed by Natural Resources Institute and conducted by the soil association in the context of the Department for International Development Natural Resources. The experience of organic agriculture projects in developing and in-transition countries is the particular focus of this book. The practical experience of producers, NGOs and advisors whether involved in private or public funded projects, buyers etc., topics are discussed in 2nd section. Likewise, the topics such as, social concerns, personal philosophy, market demand, international partnership and various case studies have been discussed in the same section. Finally, the author concludes that this book is research project and it is possible to identify some characteristics of organic projects, which are of significance to small-scale farmers in developing countries and many of these are also directly related to private farmers in CEE countries.

The book entitled, ‘Global Development of Organic Agriculture, Challenges and Prospects’ (2006) edited by Niels Halberg, Hugo Fjelsted Alroe, Marie Trydeman Knudsen and Erik Steen Kristensen, gave an overview of the global development of organic agriculture, together with in-depth discussions on political ecology, ecological justice, ecological economics and free trade relations insights on the challenges for organic agriculture. This is followed by the potential role of organic agriculture for improving soil fertile nutrients cycling and food security and reducing vetyriny medicine use, together with discussions of research necessary and importance of non-certified organic agriculture. Finally, synthesis of the challenges and promises has been discussed.

Does global trade with organic products support a sustainable development? Can organic agriculture contribute to global food security? Does organic certification ensure
natural resources and improve working conditions? Can fair trade with organic products be realized? These challenges of organic agriculture are discussed in this book.

Albert Howard in his book entitled, ‘Organic Farming Food Quality and Human Health’ (2004) examined over 400 published papers considering or comparing organic and non-organic foods in relation to key areas of food quality important to the promotion of good health food safety, nutritional content and the observed health effects in those consuming food. It point out that organic standard specifically prohibit the use of certain addictives and manufacturing processes linked to health concerns such as osteoporosis and health disease and argues that there are no grounds for complacency about the long-term effects of pesticides and addictives on our health. It asserts that there is indicative evidence suggesting nutritional differences between organic and non-organic food. The evidence is discussed in chapter No.3 the evidence presented in this report showing nutritional differences between organic and non-organic foods should not be lightly dismissed. Nor should the food safety issues raised such as organic farming, food quality and human health complements the strong environmental arguments for going organic bio-diversity of organic farming should not be discussed.

The book entitled, ‘The World of Organic Agriculture Statistics and Emerging Trends 2009’ (2009) is prepared by Urs Niggli and Bowen Diane. This book included the chapters on selected organic crops, on the organic farming related activities of UN organizations, on food security, on group certification as well as detailed information on organic agriculture in the countries of Latin America and the Caribbean. This explains that on global level the organic land area is increased by almost 1.5 million hectares compared to the data from 2006. Agricultural land and farms continue to grow in 141 countries. 32.2 million hectares of agricultural land is managed organically by more than 1.2 million producers. In addition to the agricultural land there are 0.4 million hectares of certified organic agriculture. Finally, this book states that Global demand for organic products remains robust, with sales increasing by over five billion US Dollars a year. Consumer demand for organic products is concentrated in North America and Europe; according to organic monitor these two regions comprise 97 percent of global revenues. Asia, Latin America and Australia are important producers and exporter of organic foods. The data and information compiled by FIBL and IFOAM this book about current statistics, recent
developments and trends in global organic farming is important tool for stakeholders, policy makers, authorities, the industry and consultants. It can be useful in supporting strategies for organic agriculture and markets as well as for monitoring the impact of support activities for organic agriculture.

The book entitled, ‘Technology Platform ‘Organics’ Vision for an Organic Food and Farming Research Agenda to 2025 Organic Knowledge for the Future’ (July 2008) is prepared by Urs Niggli, Anamarija Slabe, Otto Schmid, Niels Halberg and Marco Schluter. is the result of an intensive participatory 14 Months long discussion and consultation process the purpose for which is to ensure a transparent process and to broaden the legitimacy of the vision. There are total 9 chapters included in this book, which is divided in two sections. In first section of this book, chapter No.4 considers current situation of organic agriculture in the EU, EUs policy, action plan for organic food and farming, research in organic farming in Europe etc. Future challenges and trends for organic agriculture are considered in chapter no.5. Environment and ecology, reduced pollution, biological and physical soil properties, biodiversity, climate change, water shortage, fossil fuel shortage, socio-economic impact, farm ecology, social impact, food quality and safety aspects etc. topics are discussed in 6th chapter. Whereas productivity gap, energy use efficiency gaps, high variation of ecological goods and services, variation in food quality pattern and high price of organic food etc., topics discussed in 7th chapter. Our vision for 2025, general rational, what specific role could organic agriculture play, examples of research ideas, ideas of working groups, ideas of the secretariat, ideas of steering group, ideas of stakeholder forum and advisory group etc., topics have been discussed in 8th and 9th chapter. Thus, this book is the vision for 2025 of organic agriculture.

The book entitled, ‘The Complete Book on Organic Farming and Production of Organic Compost’ (2009) prepared by NPCS board of consultants and engineers. This book is the combination of general information of organic farming and information of organic compost. The present book contains the organic farming management, production and uses of various organic compounds, which are well known for agriculture and for their world wide use. Compost serves as a growing medium or a porous absorbent material that holds moisture and soluble minerals, providing the support and nutrients in which most plants will flourish. Use of organic manure is extremely essential for better crop productivity
and maintaining the fertility of soil to ensure sustainable production. The topics such as concept of organic farming, component, characteristic, sustainable agriculture and organic farming, organic vs natural farming etc., are discussed in general topics of this book. Whereas, production of organic compost, Nature and characteristics of organic compost, effects of organic fertilizers, biomass production, organic nutrients, role of organic fertilizers etc., topics are discussed in second section of this book. Finally, the present book is a good source of information of organic agriculture and organic fertilizer.

A.K. Dahama in his book entitled, ‘Organic Farming for Sustainable Development’, published by agro-botanica, publisher, Jodhpur in 2005, discussed the strength and weakness, and research needs for providing a basis for development of alternate farming system, which are sustainable sound and viable on a long term basis. The present book covers available information on principles and practices of organic farming, status of sustainable agriculture system, agriculture pollution through soil and agrochemicals, traditional and non-traditional activities, on farm and of farm waste and their use and future trends in respect of organic farming. This book also covers the topics like agricultural waste management and crop protection, waste water treatment and use for organic farming, bio gas technology and organic farming etc. Thus, present book is the combination of principles of organic agriculture and practices of organic agriculture.

The book entitled, ‘Organic Farming 2005: Towards Local and Secure Food Systems’, edited by Charles Francis, Twyla Hansen and Peter Skelton in July, 2005, is the resource of organic agriculture. The present book is divided in 7 chapters. The general topics about organic farming like local food security, myths about organic farming, sustainable agriculture and agronomy, current status and IFO standards for organic agriculture etc., are discussed in 1st chapter. Topics related with certification crop management, cropping system, on farm-testing etc., are discussed in 2nd chapter. Weed, insect, disease management, protection and crop management, GM food challenges etc., topics are discussed in 3rd chapter. The topics related to livestock production, practical livestock growing etc., are discussed in 4th chapter. The organic dairy products, meat, poultry and eggs, organic gardening, mulches, cultivation, crop rotation, marketing of organic foods, processing of organic products etc., and topics are discussed in 5th chapter. Organic farming and local food system, the conventional global food chain, local food system, economics of organic agriculture etc., topics are discussed in 6th chapter. The present book is a good source of information of organic agriculture and organic fertilizer.
agriculture, transitioning to organic production, organic Vs conventional, about GMOs, cost for organic production, price premium for organic production etc., topics are discussed in 6th and 7th chapters respectively.

2.4 Dissertations / Thesis Related to Organic Farming

The dissertation entitled, ‘Evaluating the Difference Between Organic Milk and Cheese and Inorganic Milk and Cheese Based on Sensory Perception’, prepared by Narmada Boppanna as a requirement of Master of Science in May 2007, in the graduate School University of Wisconsin Stout Menomonie, WI. To evaluate the difference between organic milk and cheese to inorganic milk and cheese based on moisture content, ash, protein, fat and sensory perception was the purpose of the study. For sensory analysis various attributes like colour, flavor, aroma, sweetness, level/ strength and overall likeness of both the products were tested. Results obtained were statistically analyzed. It was seen that the protein content of organic and conventionally prepared milk and cheese was almost the same. Moisture content for milk samples were similar too, but organic cheese showed a slight increase of 7 percent moisture content as compared to inorganic cheese. The flavor perception in organic cheese was more significantly accepted than the inorganic cheese. However, inorganic milk was highly preferred over the organic milk in terms of flavor, sweetness, and overall likeness. Aroma of Inorganic milk was also liked than organic milk, but the sweetness of both organic and Inorganic cheese was almost similar showing no difference statistical significance. Finally, the level/ strength of organic cheese also was most preferred than inorganic cheese.

The dissertation entitled, ‘Organic Agriculture: An Empowering Development Strategy for Small Scale Farmers? A Combination Study’, prepared by Alice Beban for degree of Master of Philosophy of Massey University, Palmerston North, New Zealand in 2008. This thesis explored claims that organic agriculture may be an empowering development strategy by investigating the impacts of conversion to organic farming systems on the lives of small-scale farmers in Cambodia. It interrogates the diverse uses and abuses of the term empowerment in development rhetoric and argues for an empowerment model. Results indicate that many farmers in all communities felt that their most important objective was not only to achieve food security, but to be able to grow sufficient initiatives primarily to impose their health and reduce the cost of farming inputs. As a result, all
farmers felt that they had improved their health and food security. Most farmers also increased incomes, created stronger families and communities and felt they had more control over their livelihoods. These benefits were not, however, distributed equally amongst individuals. Very poor and isolated farmers could not across benefits. This study also shows that if organics is to be viable for low resource people, it may be necessary to promote both resources and techniques in organic initiatives. Also, facts on building strong relationships both within the farmers group and linkages with local and wider Stakeholders may enhance long-term sustainability of organics initiatives.

The dissertation entitled, ‘A Review on Organic Farming for Sustainable Agriculture’ prepared by Ananata Ghimire, submitted to Department of Agriculture Extension and Rural Sociology, Institute of Agriculture and Animal Science Rampur, Chitwan, Nepal in June, 2002, has focused on the significance of organic farming to create positive impacts on productivity, soil, environment, human and animal health, food quality and nutrients etc. The component of organic farming, principles of organic farming, traditional as well as modern additives of organic farming, green manure, bio-fertilizer, methods for minimization the adverse impacts of pesticides, constraints on popularity of bio and organic fertilizer, packages for the development of organic farming in Nepal and conclusions etc. topics have been discussed in present dissertation. All the above topics indirectly conclude that how we can achieve sustainable development of agriculture sector. This study analysis that organic farming seems to be more appropriate as it considered the important aspects like sustainable natural resources and environment. Organic farming is a practical proposition for sustainable agriculture if adequate attention is paid to this issue. There is urgent need to involve more and more scientists to identify the trust area of research for the development of eco-friendly production technology.

Lammerts Van Bueren in his thesis entitled, ‘Organic Plant Breeding and Propotion: Concepts and Strategies’, Ph.D. thesis, Wageningen University, Louis Bolk Institute, Dribergen, elaborated the concept and strategies for organic plant breeding and propagation to come from an organic crop. The main objectives of this study are, therefore, clarifying the ecological and ethical principles of organic agriculture and to discuss the consequences of these principles for an organic crop. Attempts have been made to clarify the content and the use of the concepts of nature and nature less in organic agriculture, to relate
this conception to the bio-ethical literature, and to draw the implications for agricultural practice and policy in chapter no.2. Chapter no.3 describes to what extent the organic farming system differs from the conventional farming system. It stimulates the self-regulatory ability of the farm ecosystems through functional bio-diversity is also discussed. In addition to the contribution of functional diversity at farm, field and crop level to higher yield stability, the potential benefits of more genetic variation of variety level are explored in 4th chapter. In chapter no. 5, problems associated with organic seed production are discussed. In 6th chapter, the ecological and ethical principles of organic agriculture have been described. In chapter No.7, example is given of what the meaning is of the concepts and strategies for organic plant breeding and propagation by describing the case of spring wheat in the Netherlands.

The thesis entitled, ‘Status of Organic Agriculture in Sri Lanka with Special Emphasis of Tea Production System’ Ph.D. thesis submitted by Ute Willinges in October 2004 to the University of Gissen Vorgelegt Von, faculty of plant production, Justus Liebig, the researcher investigated whether the formation of farmer groups under patronage of an organization and private company next to adoption of organic agriculture practices can be recommended as an economical viable and ecological sound alternative. Hence, a survey was conducted in Candy district of Sri Lanka, as well as field and laboratory experiments were carried out in co-operation with the tea research institute, Talawakele and post graduate institute of agriculture, University of Peradeniya. Since organic agriculture plays a key role in maintaining soil fertility and biodiversity, protecting the environment and keeping social standards a model farm with organic tea cultivation as a cash crop.

Gosavi S. W. in his dissertation entitled, ‘Economic and Environmental Significance of Organic Farming in Kolhapur District’, submitted to Shivaji University, Kolhapur, for M. Phil. Degree in December 2006, studied on environment of organic farming in Kolhapur district. The main objective of the present study was to check the economic and environmental aspects of organic farming. This study includes four chapters. In 1st chapter, he presented the topics about organic farming, role of government and NGOs in organic farming, objectives, research methodology etc. The review of related literature of organic farming in India and foreign has been taken in 2nd Chapter. Economic data of organic farming includes cost of production, output and productivity, investment in organic
farming, socio-economic conditions of organic farmers etc., which are presented in Chapter-3. The difficulties faced by farmers such as diseases, price, marketing, labour, finance etc., the major findings of the study and major suggestions etc., topics are put forth in the last chapter.

2.5 Research Studies

The various research studies which have completed by working groups of experts, Government, NGOs, Government Organizations and individual researchers are considered as literature of organic farming. Therefore, the reviews of few important research studies are taken in following manner.

The research study entitled, ‘Organic and Biodynamic Farming’, for the 10\textsuperscript{th} 5 Year Plan, completed by the working group under the chairmanship of Dr. G. S. Sirohi\textsuperscript{74}, submitted to Government of India, Planning Commission, At September, 2001. The working group derived viewpoints such as, organic and Biodynamic farming has special significance in ‘Dry Land Agriculture’ consisting 65 percent of our cropped area. Experts suggested that these should be alternative scientific basis for organic farming. If we try to practice it according to the scientific basis accepted for the green revolution model, we shall not be able to create a viable basis for an alternative organic agriculture model. The fact remains that from a practical viewpoint bio-dynamics is proven to be productive and yield nutritious, high quality foods. A broad based think tank with suitable sub-committees is to be established and establishment of a centre of excellence under the National Agricultural Research System is recommended. The experts also suggest that there should be a regulatory authority that would be empowered to define and regulate the quality of all products and inputs. Finally, the working group recommended that introduction of course curriculum on ‘Concept and Practices of Organic Farming’ in undergraduate and postgraduate levels in all State Agricultural Universities and affiliated colleges should be made mandatory.

The research study entitled, ‘National Study: India’ completed by Dr. Prabha Mahale\textsuperscript{75} in 2002, studied topics which are organic farming in the national context, which includes institutional frame work and again which includes historical development of organic agriculture and its key actors, regulatory frameworks (standards, inspection, certification), challenges of domestic certification, key actors (Central Government, NGOs, Farmers academia, private sector etc), international linkages, official research and
development, education and extension, official support and pricing policies etc., second major topic also includes topics such as organic production, post-harvest handling and market, keystone foundation in Tamil Nadu, socio-economic potentials for organic farming, support services etc. Third major topic includes conclusions and recommendations, under which potential of organic agriculture, limitations for organic agriculture, challenges for future developments, recommendations on the national level, recommendations for regional co-operation activities etc., topics are given by researcher. Thus, this study is the study of organic farming at national level in Indian economy.

The research study entitled, ‘Organic Farming in India: Relevance, Problems and Constraints’ completed by Dr. S. Naraynan Department of Economic Analysis and Research, National Bank for Agriculture and Rural Development, Mumbai, 2005. The study discussed the progress and the present status of organic agriculture in the major practicing countries. The ill effects of the conventional farming system being felt in India are also analyzed in the context of the relevance of organic farming in the Indian conditions. Efforts made by the government and people to promote organic agriculture in the country and the prospects for its spread is assessed too. The major weaknesses of organic agriculture in the country are absence of linkages between the farmers and markets and absence of financial support. India has the potential to become a major organic producing country given the international demand for the cultivation of a number of crops, the size of domestic market and above all the long tradition of environmental friendly farming and living. However, an appropriate national agriculture policy to its coverage, financial support, creation of linkages, processors, traders and consumers, inspection and certification and increasing the public awareness of organic agriculture, should be designed.

The research study entitled, ‘Organic Agriculture and Poverty Reduction in Asia: China and India Focus’, completed by group of experts, scientist, member of scientific committee, of the International Fund for Agricultural Development. The Primary goal of this evaluation was to enable a better 2/3rd of the world’s, where poor live. In particular, this evaluation aims to understand the potential value of organics to farmers-specially small or poor ones-and the role of organics as an option in development programs. It is organized in to six chapters. The first chapter provides an introduction to the characteristics of the farmers, products, and situations studies. Chapter-2 offers an overview of key market-
related issues with an update on the regional and international situation of organic agriculture and its trade statistics. Chapter-3 evaluates the key characteristics of organic production and marketing. It begins with a critical look at the conversion process, issues of fertility and plant protection. Chapter-4 reviews the key impacts—both positive and negative—that are associated with the adoption of organic methods. Chapter-5 covers the public sector role and how these are affecting organic agriculture. Chapter-6 closes with a series of concise conclusions to highlight the most important lessons of these studies and to identify the factor that are most important to facilitate the adoption of organic agriculture.

The study entitled, ‘Ecosystem Services as a Tool for Production Improvement in Organic Farming—The Role and Impact of Biodiversity’ Prepared by Alastair Taylor. The study report was based on workshop, conducted by FiBL Research Institute of Organic Agriculture, Switzerland on 15, 16 April, 2005. The purpose of this workshop was to create a meeting to exchange knowledge between two programs in organic production FiBL, Research Institute of Organic Agriculture and Formas-Eco and trade relevant research questions for a future research program with focus on the role and impact of biodiversity in organic farming. In this workshop issues such as those affecting biodiversity in organic farming and how bio-diversity could be related to ecosystem services on a field and landscape level were discussed challenges and threat for biodiversity in organic farming in a global perspective have been discussed. The workshop is presented here by an abstract of the presentations. The discussion highlight the need for further research on how to integrate ecosystem services in the organic production as production tools, and how environmental benefits from such integration can be recognized by society. The discussion also indicated the need for research farms/laboratories for systems research on multi functionality and implementation of ecosystem services as design principles for future sustainable farming.

The study report entitled, ‘Sustainable Agriculture in a Globalized Economy’, prepared by International Labour Organization in 2000. The objective throughout the report was to show the relevance of the ILOs core and agricultural labour standards to SARD. This report is issue-oriented. It includes total 6 chapters. Chapter-1 sets forth the context in terms of its key themes-globalization, sustainability and modernization. Chapter-2 focuses on the performance of the agriculture sector in the past few decades with emphasis on agriculture’s contribution to living standards and the transformation of economics.
Chapter-3 expounds on the major macroeconomic issues in agriculture-prices and subsidies, commodity prices and external terms of trade and the role of rural non-farm activities, while 4th chapter elaborates on the social issues, which governments and farmers increasingly have to confront, because of chasing global attitudes to working conditions; child labour, gender, private voluntary initiatives, occupational safety and health, and genetic modification. Chapter-5 contains the conclusions and chapter-6 contains summary and suggested points for discussion. In this way, the issues discussed attempt to strengthen the four strategic objectives of the ILO agreed at the 87th session of the International Labour Conference at June 1999.

The study report entitled, ‘Promoting Production and Trading Opportunities for Organic Agriculture Products in East Africa’ prepared by UNCTAD and UNEP80. The study report analysed that organic agriculture offers developing countries a wide range of economic, environmental, social and cultural benefits. Global markets for certified organic products have been growing rapidly over the last two decades. Due to expanding markets and price premiums, recent studies in Africa, Asia and Latin America indicate that organic farmers generally earn higher incomes than their conventional counterparts. While, improving soil fertility, biodiversity and other ecosystem services that underpin agriculture crop rotations in organic farming provide more habitats for biodiversity due to the resulting diversity of housing, breeding and nutritional supply. In terms of benefits for climate change, various studies have shown that organic farming uses 20 to 56 percent less energy per product unit of crop dry matter than conventional agriculture, and that organic fields sequester three to eight more tons of carbon per hectare. It makes resource poor farmers less dependent on external resources and helps them enjoy higher and more stable yields and incomes, which enhances food security. It has been also observed strengthen communities and give youth an incentive to keep farming thus reducing rural-urban migration.

2.6 Conclusion

Recently, India’s agricultural sector is being suffering from various problems such as, low agricultural productivity, high cost of production, loss of bio-diversity, lower quality of product, poisonous production, lack of test in production, high prices of agricultural commodities and less output etc. All these problems can be solved by organic farming system. The various research studies at international level have proved these things, but yet
research and development activities are not developed at sufficient level in organic farming system. Such research activities are more important and will be significantly productive.

It seems from the above review from the various sources that organic agriculture and food security, nutritional quality, climate change, biodiversity, soil fertility, sustainable development of agriculture, potentials of organic farming, environmental benefits, poverty reduction, livestock production and health, human health etc., all these topics are examined so far. Above literature also discusses about the benefits of organic agriculture. The major difference between the present research and other available reviewed literature that are studied presently are economic benefits, environmental benefits, socio-economic conditions of farmers, profile of the study area and development of organic agriculture at global level etc. Again the present study compares economic and environmental benefits between organic and inorganic agriculture none of the studies from the above review have discussed all topics simultaneously with comparison between organic and inorganic agriculture. Each study has focused on single aspect of it. However, there are some important areas for further research in respect of organic agriculture. They are organic farming and climate change, animal health, organic compost, food security and nutrient, organic seeds, export of organic product, water and soil pollution etc.

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