

Organic farming for sustainable economy

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Human beings are proud of their ability to think and feel. But their greed is affecting the whole planet. Though they are only one of the 50 million species on the planet. In Indian history 5000 years B.C, the knowledge of agricultural methods was known. Our ancestors were utilizing natural sources without disturbing natural processes. In 'Vedas,' the soil has been called as protector of all living things, animals, human beings and plant species, that is why the name has been given to soil as Dharani (Protector). This concept was vanished due to population explosion which paved the way for inorganic farming during 1960's green revolution. The green revolution on the other hand was mono-cultural and chemical intensive. It brought in prosperity with only rice and wheat but also resulted in dead soil, poisoned water and food, narrow genetic base and suicide of farmers. It is, therefore, clear that India needs biological diversity in farming. So now it is time for focusing on organic farming which encompasses diversified farming.

The global organic land area is increasing rapidly and sales are increasing by over five billion US dollar per year. India is bestowed with lot of potential to produce all variety of organic crops. India ranks 33rd in world area under organic farming. Madhya Pradesh has the highest area under organic farming (1.1 million ha or 52%) followed by Maharashtra (0.96 million ha or 33.60%) and Orissa (0.67 million ha or 9.70%). India exported 86 items (2010-11) with the total volume of 6987 MT. The export realization was around 157.22 million US \$ registering 33 per cent growth over the previous year (Prashanth *et al.*, 2013). However, the share of India in organic production is around two per cent only. But there is a considerable latent

interest among farmers in conversion to organic farming in India. But some farmers are reluctant to convert because of the perceived high costs and risks involved. Despite the attention which has been paid to organic farming over the last few years, very little accessible information actually exists on the costs and returns of organic farming in India. The present paper focuses on reviewing the feasibility of organic farming, overcoming draw backs if any to improve farmer's economy, soil and human wealth.

Organic farming, would be a farming system devoid of chemical inputs, in which the biological potential of the soil and underground water resources are conserved and protected from the natural and human induced degradation or depletion by adopting suitable cropping system including agro-forestry and methods of organic replenishment besides natural and biological means, which are used for pest and disease control.

Features of conventional farming :

- Conventional farming is not sustainable and results in decrease in yield.
- Imbalance use of inorganic fertilizers and its ill effect on physical, chemical and biological properties of soil.
- Imbalance of natural enemies due to inorganic chemicals and its effect on health of human beings and animals.
- Continuous mono cropping leads to ill effects on natural processes.
- Inefficient use of natural resources like soil water, plant and animals.
- Inorganic farming heavily uses costly inputs which

increase expenditure.

Characters of organic farming :

- Natural and biological methods in organic farming help in protection of natural resources like soil, water, flora and fauna.
- Organic farming helps in maintaining ecological balance.
- Organic farming helps in soil fertility improvement and sustainable yield of crops and hasten the natural processes in soil.
- Management of pests/diseases by natural and biological methods helps in avoiding environment pollution.
- Organic farming ensures self sufficiency, healthy food and bio safety.

Principles of organic farming :

- Organization of crop and livestock production and the management of farm resources in such a way that it harmonizes rather than conflicts with natural system.
- Achievement of closed cycle to the greatest extent possible between soil, plants, animals and people and avoidance of environmental pollution.
- Maintenance of soil fertility for optimum production, recycling primarily renewable resources.
- Reduction of pest and disease incidence through carefully designed farm rotation and enterprise structure: use of resistant varieties, the encouragement of beneficial pest predators and the use of other biological pest control techniques.
- Use of forms of animal husbandry with respect the welfare and behavioral needs of farm live stock.
- Use of approximate farm machinery and cultivation techniques which reduces non-renewable resource consumption.
- Enchantment of environment in such a way that wild life flourishes and it is enjoyable for people both working within the system and viewing it from outside.

Components of organic farming :

Crop and soil management :

Organic farming systems encourage the use of crop rotations and manures to maintain soil fertility. Carefully managed soils with a high proportion of humus enhance water retention, ion exchange and activities of beneficial microflora in the soil. High proportions of humus in the soil prevent soil erosion and improve structure of soil.

On farm waste recycling :

It helps in good manure management resulting in improved fertility and avoids nutrient losses. Composting of all inorganic wastes is important in organic farms (Dahama,

1996). Use of green manure crops like sunhemp, glyceridia, etc., increases grain yields of cereal crops as compared to cotton and sorghum stubbles (Hundekar, 1992).

Non-chemical weed management :

The elements to be considered in reducing weed problems are crop rotation, green manure, manual management and tillage. In addition, mechanical and technical methods are used in pre-emerging system. Mulching on a large scale by using manure spread may also be helpful in weed control (Dahama, 1996).

Bio-insecticides :

Biological control of insects by micro-organisms has been the subject of most research and development efforts in the past and is consequently the most successful aspect of biological control at present. *Bacillus thuringiensis* has been commercially available for the last 30 years. Improvements in the strain and formulations have led to a substantial in the market size for the control of over 100 inset species. A new strain, *B. thuringiensis* var *israelienesis* available for control of mosquitoes including of Anopheles. The identification of natural chemicals and subsequent formation of their derivatives can open new areas of pest control. Chemicals which do not kill the insects, but either attract repel or modify their usual behavior may also be regarded as biological control agents. Behavior modifying chemicals which reduce mating frequency or release large number of sterile insets, control pests biologically by reducing their number. Insect pest management with neem oil, nicotine from tobacco, NPV, parasites and predators is important strategy in organic farming.

Biological disease control :

A major success in plant disease control has been the discovery, development and marketing of potential bioagents like *Trichoderma harzianum*, *T. viridde*, *Pseudomonas fluorescens* and *Bacillus subtilis*.

Bioherbicides :

The bureau of plant pathology of the division of plant industry in Granville, Florida has developed the technique to use *Phytophthora palmivora* for the control of milk weed in citrus orchards. *Aeschynomene virginica* a leguminous weed in rice can be effectively controlled by *Trichum gloeosporides*. Broad leaved crop like cow pea and bioagent zygogramma holds great promise for control of parthenium.

Resistance breeding :

Plant resistance is also included in the definition of biological control. Plant breeders have made many successes in producing resistant varieties for pests and diseases. Resistance to soil pathogens may also be provided by the use

of resistant root stocks and grafting. Recent research has shown that plant can locally accumulate anti-microbial compounds.

Advantages of organic farming :

- Organic manures produce optimal conditions in the soil for high yields and good quality crops.
- Ensures supply all the nutrients required by the plant (NPK, secondary and micronutrients).
- Improve plant growth and physiological activities of plants.
- Improve the soil physical and biological properties such as granulation, aeration, easy root penetration, improved water holding capacity and activities of beneficial soil microflora. The fibrous portion of the organic matter with its high carbon content promotes soil aggregation, aeration of clay soils and improves water holding capacity. The carbon in the organic matter is the source of energy for microbes which help in nutrient recycling.
- Improve the soil chemical properties such as supply and retention of soil nutrients and promote favorable chemical reactions.
- It reduces the need for purchased inputs.
- Most of the organic manures are waste or byproducts which on accumulation may lead to pollution which is minimized by way of utilizing them for organic farming.
- Organic fertilizers are considered as complete plant food. Organic matter restores the pH of soil which may become acidic due to continuous application of chemical fertilizers.
- Organically grown crops are believed to provide more healthy and nutritionally superior food for man and animals than those grown with chemical fertilizers.
- Organically grown plants are more resistant to disease and insects and hence, only a few chemical sprays or other protective treatments are required.
- There is an increasing consumer demand for agricultural produce which are free of toxic chemical residues. In developed countries, consumers are willing to pay more for organic foods.
- Organic farming helps to avoid chain reaction in the environment from chemical inputs.
- Organic farming helps to prevent environmental degradation and can be used to regenerate degraded areas.
- Diversification of crops gives much more secured income than to rely on only one crop enterprise.

Constraints in organic farming:

Initially there may be some constraints which inhibit the farmers from adopting organic farming.

- Land resources can move freely from organic farming to conventional farming they do not move freely in the reverse direction.
- In changing over to organic farming an initial crop loss generally occurs.
- Biological controls might weaken or destroyed by chemicals, which may take three or four years to build up.
- Organic farmers may be afraid to enter the new market without adequate government support.
- Decomposition process in organic farming is very slow.

Economics of organic farming :

The research experiment conducted by Panigrahi *et al.* (2008) to compare the organic cultivation of paddy with inorganic methods in *Rabi* 2003-04 at Dharampur village in Orissa state revealed that total cost incurred was Rs. 4740, 6855 and 5690 per acre with control, chemical and organic, respectively. Similarly, grain yield obtained with their value were 12.7 quintals with Rs. 6604, 20 quintals with 10504 and 23 quintals with Rs. 12220 in that order. Straw yield and its value were 15.85 quintals/ acre with Rs. 1268 under control, 25.07 quintals with Rs. 1755 under chemical and 29.47 quintals with Rs. 2358 under organic condition. Thus gross returns obtained were Rs. 7872, Rs. 12259 and Rs. 14578 per acre under control, chemical and organic cultivation methods, respectively. Similarly, net returns obtained were Rs. 3132, Rs. 5404 and Rs. 8888 per acre in that order. B: C ratios obtained were 1.66, 1.78 and 2.56 under control, chemical and organic cultivation methods, respectively. Another experiment conducted by the above authors in Orissa state for the same crop in village Bhimapur for *Kharif* 2004-05 revealed that B:C ratios were 2.23 in controlled experiment, 1.97 in chemical treatment and 2.43 in the organic cultivation experiments.

Rai and Yadhov *et al.* (2011) conducted experiment in 2010 at Banars Hindu University Varanasi on enzymatic activities. Application of organic sources of nutrients was found to be favorable. Application of cent per cent nitrogen through urea along with 10 kg N per ha through carpet waste was found to be highly effective for achieving more urease enzymic activity. The activity of dehydrogenase was maximum in the soil treatment in soil with cent per cent nitrogen by FYM. The activity of alkaline phosphate was recorded more in treatment of cent per cent N through press mud. Overall authors concluded that application of organic sources of nutrients were found favorable for enzymatic activities which inturn determine the soil health. They provide living environment to the soil health.

Padel and Uli (1994) Perceived several studies on costs and returns of organic farming in various crops in Germany. Their study revealed that the organic farming under German conditions was equally profitable with conventional farming.

Lower yields for arable crops were compensated by reduced costs of inputs and premium prices for most of the crops. Many farmers explained that financial stability was the main reason for converting to organic farming. Introduction of support schemes for conversion and continuing organic farming also made a significant impact on the profitability.

John (1994) examined various field experiments conducted on organic farming in Canada. Many sample farms recorded yields that were the same or slightly below conventional farms even though some market regulatory problems exist in case of organic products. The prices for them were higher (about 30%) than the conventional products. Overall the study concluded that 72 per cent of farmers strongly convinced that organic farming is as profitable as conventional.

Wynen (1994) carried out a review study on organic farming in Australia. He concluded that the wheat yields were almost similar between organic and conventional farms. The study also indicated that the variability of wheat yields on organic farms was lower than on conventional farms. The functional results of two groups of farmers per hectare were remarkably similar.

Shirsaagar (2008) studied the impact of organic farming on economics of sugarcane cultivation in Maharashtra. The study was based on primary data collected from two districts covering 142 farmers, of which 72 were growing organic sugarcane (OS) and 70 were growing inorganic sugarcane (IS). The results implied that OS cultivation enhanced human labour employment by 16.90 per cent and its cost of cultivation is also lower by 14.20 per cent than IS farming. Although yield from OS was 6.79 per cent lower than the conventional crop, it is more than compensated by the price premium received and yield stability observed on OS farms. Overall the OS farming gave 15.63 per cent higher profits than IS farms. The study conducted during the cropping year 2010 by Kumara Chryalu. and Biswas (2010) on economics and efficiency of organic farming vis-a-viz. conventional farming in India revealed that overall, crop economies results concluded that the unit cost of production is lower in organic farming in case of cotton (both in Gujarath and Punjab) and sugarcane (both in U.P and Maharashtra) crops where as the same is lower in conventional farming for paddy and wheat (both in Punjab and UP) crops. These mixed results are in conformity with the findings of Lampkin and Padel (1994). The DEA (Data Envelopment

Analysis) efficiency analysis conducted on different crops indicated that the efficiency levels are lower in organic farming when compared to conventional farming, relative to their production frontiers. The results conclude that there is ample scope for increasing the efficiency under organic farms. Further, authors viewed that exposure to more trainings as well as increase in technical guidance would enhance the productivity and efficiency of organic farms in India.

Conclusion :

Due to scarce available information on economics and efficiency of organic farming in India, overall economics of crops concluded that the unit cost of production is lower in organic farming (cotton, sugarcane, paddy, wheat and other crops). Due to short period efficiency of resources analyzed for different crops indicated that efficiency levels are lower in organic farming when compared to conventional farming. But, if you consider the long term sustainability effect in production, the economics will be for better even at infinity period. The long-term effect of organic farming on economics is no way to compare the conventional farming economics. Now the role of government is critical in motivating the farmers towards organic farming because of costly inputs of inorganic farming (like chemical fertilizers, pesticides etc.). It is a need of the hour to go for organic farming. Based on all these information, knowledge and technology available organic farming will be more simple and that will be helpful in increasing sustainable yields of crops and also improves soil and human health. Organic farming can be made simple and feasible by following the guidelines. Crop planning should be made easy in such way that the long term soil fertility level should be maintained uniformly at infinite period of time. Decomposition of crop residues by various recent technologies should be used to improve the soil fertility by improving mineralization process. Composting of organic residues enriches the nutrients in the soil. Use of concentrated organic manures for high nutrient requirement of the crops should be developed. The proper use of microbial inoculums technology should also be used in enhancing nutrients availability in soils to stabilize the yield levels. Integrated farming system should be popularized to maintain organic carbon content in soil uniformly and at infinite period not only to increase the economy of farming community but also to increase soil productive capacity.

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