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IS ORGANIC FARMING AN ALTERNATIVE TO INDIAN INTENSIVE FARMING?

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Abstract

Rise in food grain production after green revolution results in devastation of natural resources more particularly soil and water and thereby reduced crop productivity over the years. Scientists are, therefore, suggesting an alternative and natural way of farming like organic farming which relied more on biological as well as on locally available inputs. But a query posed by many people is whether organic farming will produce enough food for India's huge population. Considering this, the review paper addresses different issues in organic farming. In most of the literature cited, it has been argued that organic farming is productive and sustainable in long run, but there is a need for strong Government support to it in the form of subsidies and research.

Key words*:* Agricultural Sustainability, Yield Security, Soil Fertility.

Introduction

After Indian Independence, it was felt that food grain production was not compatible with rising population. Hence during 1960's Green revolution was introduced. The collaboration between Rock Feller Foundation of America and Mexican Government resulted in dwarf wheat production. Similarly IRRI of Phillipines produced high yielding new paddy varieties. All these played a major role in India's Green revolution. Along with new crop varieties more chemical fertilizers and pesticides were also introduced. Within ten years of introducing Green revolution, machines like diesel motors, electric pump sets, tractors and farm equipments were introduced to cope up with increased food production and shortage of agricultural labourer. All these efforts resulted in self sufficiency in India's food grain production but the consequences as a result of intensive farming is seriously noticed in many ways. The deleterious effect associated with green revolution is the reduction in soil microbial activity and thereby poor soil fertility due to profound application of chemical fertilizers and pesticides. The other effects of green revolution were the depletion of ground water level as a result of intensive use of water for monocropping of paddy and wheat and reduced cultivation of traditional varieties due to adoption of short duration high yielding varieties and hybrids.

The status of environmental resources in India has been clearly indicated in various studies. According to Ministry of Environment and Forest, State of the Environment Report 2009, intensive farming activities contributes to soil erosion, land salinisation and loss of nutrients. Processes which attempted to increase agricultural productivity results in large-scale and rapid destruction of fertile agricultural soils in India (GoI, 2008). NASA's Gravity Recovery and Climate Experiment (GRACE) found that in Northern India over the past decade, groundwater has been depleting by one foot per year. Around 29% of India's groundwater blocks are semi-critical, critical or over-exploited (World Bank's "Deep Wells and Prudence", 2010). Also, most of India's surface water are polluted, (Ministry of Environment, State of the Environment Report, 2009). In addition to environmental degradation, Bio and Agro diversity loss due to rapid monocropping has serious livelihood implications including health and nutrition security. Nearly 2/3rd's of our farmlands are in some way either degraded or sick and only about 1/3rd's are in good health' (Planning Commission's 'Agriculture Strategy for 11th Plan: Some critical issues'). The increased paddy productivity due to

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intensive farming results in depletion of ground water level. (Kavitha *et al.*, 2016)

The green revolution technologies created the outlook that agricultural yields are measured only through marketed commodities. Millets which augment soil health by returning organic matter to the soil were rejected as 'marginal' crops. Nitrogen fixing crops like pulses were displaced. Plant parts which were not commercial but used mainly as input for maintaining soil fertility were totally ignored (Shiva, 1992).

Besides depletion of natural resources, intensive farming also results in destruction of self reliant rural economy. Farmers were forced to buy everything out of their village such as seeds, fertilizers and pesticides. Thus at one stage, unable to cultivate with their own means, farmers depend on credit agencies to suffice their money needs. As per National Sample Survey Organisation's (NSSO) 2013 report, the average monthly income of agricultural households was− 6426 but their monthly expenditure during the same period was− 6223. Thus with the low returns due to decreasing yield and increasing cost of production, farmers were unable to return their debts and as a result farmer's suicides have been steadily increasing over the years. As per Accidental Death and Suicides in India (ADSI) Report, 2014, since 1995, over three lakh farmers have committed suicide. Suicides by farmers and farm labourers increased (12,360) in 2014 against 11,772 in 2013. Of the total number of suicides recorded, 5,650 were farmers, while 6,710 were agriculture labourers. Bankruptcy and indebtedness were the major reasons identified behind suicides. More number of farmer suicides were recorded in Maharashtra and Telengana with 2,568 and 898 respectively. The report also indicated that small and marginal farmers accounted for around 72.4 per cent of the total suicides.

Green revolution also posed ill effect on human health. In many cases over 90 % of inorganic produce of vegetables, fruits, food grain, milk, etc contains poisonous agro chemical residues, which are harmful and unsuitable for consumption (Paroda, 2001). Punjab farmers in India who were once celebrated for practicing successful green revolution practices where now victims of many deadly diseases including cancer. The average fertilizer use in Punjab is high at 380 kg/ha, highest in India, almost three times the national average of 131 kg/ ha, (National Centre for Agricultural Economics and Policy Research). It is reported that every village in Punjab with a population of 3,000 to 5,000 has at least 30 cancer cases in a period of 8 to 10 years. In the state, the prevalence of cancer was more in Malwa region. As per State of Environment Report (2007), 75 per cent of the pesticides used in Punjab was applied by Malwa farmers.

The after effects of green revolution have encouraged the farmers to take up sustainable means of farming, *i.e.* organic farming. Organic farming is a production system which not only avoids, the use of synthetic fertilizers, pesticides and growth regulators, but also brings in harmony between plants, animals and soil microbes. The concept of organic farming is native to India. Farmers in the *Vedic* period were preoccupied with the knowledge of soil fertility, seed selection, plant protection, sowing seasons and sustainability of crops in different lands (Sofia *et al.*, 2006). The objectives of organic farming were the environmental, social and economic sustainability (Stockdale *et al.*, 2001). Currently, India ranks 16th in the world in terms of area under organic farming. However, 1/2 of world's organic farmers are estimated to be in India. In 2013-14, total area under organic certification was 47.2 lakh hectares. Out of this, 7.23 lakh ha was under cultivated area. India produced around 1.24 million tonnes of certified organic products which includes Basmati rice, Pulses, Sugarcane, Cotton, Organic Cotton fiber, Oil Seeds, Spices, Coffee, Tea, Fruits, Vegetables, Dry fruits etc. The objective of this paper is to review and bring together different issues in organic farming in India.

Review on Organic Farming

The review has been grouped under four key issues

1. Organic farming and soil fertility
2. Organic Farming and Yield
3. Organic Farming and Economics
4. Organic Farming and Consumers Demand

1. Organic farming and soil fertility

In general, organic farming increases the soil fertility level. This issue has been indicated in various studies. The efficiency of organic inputs to fulfill the nutrient requirement of crops is not as assured as mineral fertilizers, but the joint use of it along with chemical fertilizers is capable of producing higher crop productivity and improving soil quality on long-term basis (Chhonkar, 2002). Application of organic sources boost up the growth and activity of mycorrhizae and other beneficial organisms in the soil and is capable of sustaining higher crop productivity and soil health (Nambiyar *et al.*, 1992). In the biodegradation process, earthworms work together with microbes and produce vermicompost. Vermicompost supply macro elements (N, P, K, Ca, and Mg) and micro elements (Fe, Mo, Zn, and Cu) (Amir and Fouzia, 2011)

Increase in soil organic carbon pool by one metric tonne "ha^{-1}"y^{-1} can increase food grain production by 32

million metric tonne "y^{-1} in developing countries. (Lal ,2005). Singh (2002) indicated that the use of FYM and green manure maintained high levels of Zn, Fe, Cu, and Mn in rice-wheat rotation. Badanur *et al.*, (1990) studied the effect of organic manures and crop residues on crop growth and physical and chemical properties of a vertisol soil. The results concluded that the incorporation of sorghum stubbles and safflower stalks increased the infiltration rate, bulk density and water content at field capacity as compared with the fertilizer treatment in sorghum field. The effects on organic carbon, available N and available P with leucaena, sunnhemp and farmyard manure were similar.

Thiripurasundari and Dhivya (2015) conducted a study at various districts of Tamil Nadu, India and found out that organic farming improves the supply and retention of soil nutrients, granulation, good tilth, easy root penetration, water holding capacity and maintaining environment health by reducing the level of pollution and ensures optimum utilization of natural resources.

2. Organic Farming and Yield

A common question asked is whether organic farming suffice food demand. The probable answer to this question is even the conventional intensive farming systems are currently failing to feed the world, not because of problems with productivity, but because of problems with food distribution. (Shiva, 1992).

An analysis done by FAO showed that intensification of organic farming in most subsistence systems yields 40% more; while transition losses with organic farming can be overcome in 4-7 years' time. In the long run, organic farming offers more advantages compared to conventional farming, because it ensures higher yield security and reduces dependence on external inputs, thus making poor households less crisis-prone. (Julia *et al.*, 2008). Apart from some of the drawbacks associated with organic farming like yield reduction during the initial conversion period, high cost for certification and improper marketing channels, organic agriculture is productive and sustainable (Mader *et al.*, 2002).

Tamaki *et al.*, (2002) indicated that the growth of rice was better under organic farming than with conventional farming. Singh *et al.*, (2001) showed that the application of 7.5t FYM ha^{-1} in paddy field produced significantly more grain, and straw yields over unfertilized fields. Somasundaram *et al.*, (2007) in thier study on maize, sunflower, and green gram observed increased nitrogen accumulation and higher yield under biogas slurry with panchagavya, a mixture prepared by adding five products of cow such as cow dung, urine, milk, curd and ghee and then allowed to ferment. Singh (2000) reported that the application of vermicompost at 13–20qha^{-1} increased yield of pea (23.62qha^{-1}) and groundnut (12.16qha^{-1}). Dayal and Agarwal (1999) observed that the seed yield of sunflower was increased with the higher rate of vermicompost (10 t ha^{-1}). Jat and Ahlawat (2006) revealed that the application of 3t vermicompost ha^{-1} to chickpea improved dry matter accumulation, grain yield and protein content in chickpea, soil nitrogen and phosphorus and bacterial count and dry fodder yield of succeeding maize. Ranganathan and Selvaseelan (1997) reported that the application of spent mushroom and rice straw compost increased rice grain yields by 20 per cent over NPK fertilizer. Sanwal *et al.*, (2007) studied the effect of various organic manures on yield and quality parameters of turmeric and their effect on soil fertility. The results showed 16-103 per cent higher rhizome yield and also improved soil fertility and productivity over control.

Renuka and Sankar (2001) indicated in tomato that the yield increased two and half times with the application of organic manures in comparison with inorganic fertilizer (18.44 tonnes). Singh *et al.*, (1997) studied the response of chilli to vermicompost and observed that the application of vermicompost increased the microbial activities. Tomar *et al.*, (1998) recorded the highest yield (97$gplant^{-1}$) through vermicompost in brinjal. Shreeniwas *et al.*, (2000) conducted an experiment on ribbed gourd and found out that the increasing levels of vermicompost (0, 5, 10, and 15tha^{-1}) increased the fruit weight and fruit volume. Patil *et al.*, (1997) indicated that total potato tubers yield was significantly higher with the application of vermicompost at 4t ha^{-1} and FYM at 25t ha^{-1}.

3. Organic Farming and Economics

It is argued that organic farming reduces expenditure on crop production. The following studies pointed out the effect of organic farming on cost of production thereby on profitability. Kavitha *et al.,* (2013) in their study on estimating the efficiency of organic farmers and Bt farmers in Tamil Nadu, India find out that no significant difference in yield between two farming situations was observed. It was also found that the cost of cultivation of organic farmers were lower than the Bt farmers by 4 per cent due to less expenses on seeds, manures, natural plant protectors and irrigation. The study indicated that higher profitability was the important feature of organic cotton farming. The study also noted out that net income in organic farming was more than− 4150 per acre than in the Bt farming.

Charyalu, 2010 conducted a study to analyze the

efficiency of the farming systems in four states of India on four major crops *i.e.*, cotton, sugarcane, paddy and wheat and it concluded that in case of cotton and sugarcane crops, the unit cost of production was lower in organic farming whereas the same was lower in conventional farming for paddy and wheat crops. Daniel *et al.,* (2005) compared the yield of organic and conventional cotton in Andhra Pradesh and found out that organic cotton yielded at par with conventional cotton. The main contributing factor to higher profitability was the reduced expenditure on pest management.

4. Consumer Demand and Organic Farming

Awareness in organically produced food is increasing throughout the world in response to concerns about food safety and human health concerns (Gregory, 2000), animal welfare considerations (Harper and Makatouni, 2002) and concern about the environment (Wandel and Bugge, 1997). There are several factors which affects the awareness level of organic foods among the consumers. Bhaskaran and Hardley (2002), found out that consumers in the age group of more than 55 years tend to make preventive health decisions, because of higher health vulnerability than younger individuals. But, in some of the studies age of the consumer does not play an important role.

Education is an important factor of purchase motive of organic food. Consumers with higher education are more likely to buy organic food products. Gender plays a crucial role in purchase decision of organic products. Women buy organic food in larger quantity and more frequently than men (Arvanitoyannis and Krystallis, 2004).

Shanmuga Priya (2014) conducted a study at Coimbatore city of Tamil Nadu, India and reported that age, education, health, income, price, distance and availability were important factors in consumer preference of organic vegetables. The study also indicated that price was the major constraint faced by the consumers in making purchase decisions of organic vegetables followed by limited or inadequate supply, lack of information and inadequate organic outlets.

Chandrashekar (2014), conducted a study at Mysore city of Karnataka, India and analyse the consumers perception towards organic products and the results revealed that the irregular availability of organic products was indicated as major constraint by majority of organic consumers and they view that the organic products were too expensive and were not properly certified from any organic certified agency or authority.

A study conducted by Raksha (2016) at Chennai city of India indicated that the consumers was of the opinion that organic food had better taste than highly pesticide prone general foods and that they felt energetic after having it. Mohamed Bilal Basha and Ramesh (2014) observed that health concern was the prior motivation to choose organic food.

Shashikiran *et al.*, 2014 conducted a study at Bangalore city, India and found out that the consumers were willing to pay premium for organic products. The study revealed that standard packaging along with a logo or statement confirming the organic status adds value to the products.

Thippeswamy (2013) pointed out that government has to take suitable measures like separate market for organic products, announcement of minimum support price, demand creation by way of conducting more awareness programmes, subsidy for organic inputs producers, certification of farms and increase in investment on organic research and development activities. Deshmukh and Nitin (2015) listed out that factors like lack of access to guidelines, market information, vocational training, risk of low yield, certification and input cost strongly discourage small farm holders in India.

Conclusion

The review of various studies over the period showed that organic farming could provide quality food without adversely affecting the soil nourishment and the environment. This review study also indicated that the key factors affecting consumer demand for organic food were the health consciousness and the willingness of the public to pay for the high-priced produce. Studies have shown that organic products are more expensive and unaffordable. It is mainly because of lack of integrated supply chains. Besides, certification also adds to the cost. These factors act as a hindrance in the promotion of organic farming. Creating awareness about organic farming and reducing certification cost, will induce more farmers towards organic farming. It has been concluded that given proper Government support, organic farming will become a boon to Indian farming in the coming decades.

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