Global Journal of Business Research
Vol. 12, No. 2, 2018, pp. 83-90
ISSN: 1931-0277 (print)
ISSN: 2157-0191 (online)

IBFR
www.theIBFR.com

ECONOMIC AND ENVIRONMENTAL ASPECTS OF ORGANIC FARMING: EVIDENCE FROM INDIA

Nisha Singh, Livingstone College

ABSTRACT

This paper evaluates economic and environmental facets of small, landless and marginal farmers and provides solutions on how farmers can enhance their income with organic farming. A majority of the farming community is resource poor and purchasing fertilizers and chemicals in adequate quantities is beyond their capacity, thus encouraging organic farming. Moreover, Organic farming is favorable for small and scattered agriculture land holders. This paper finds that education was the most effective and compelling component for a farmer to utilize organic farming techniq1ues. Further, environment and financial motives were primary motives behind the farmers' conversion to organic farming. In addition to the net profit advantage of organic farming, other hidden environmental benefits of organic farming should also be identified to make it more influential.

JEL: Q5

KEYWORDS: Diversification, Economic Aspects, Marginal Size, Elasticity, Purchasing Power

INTRODUCTION

Organic farming aims to maintain and improve soil fertility by evolving a sustainable agricultural system. The goal is to ensure adequate food production that relies, as much as possible, upon resources from within a local area. Organic farming is an applied biology as it manages to incorporate farm waste recycling, non-chemical weed management, biological pest control, and integrated nutrient management for sustainable soil fertility and crop productivity. India's food production was a success story following the green revolution. In the late 1960s, India significantly increased food production when the green revolution was launched. During the post green revolution, the production of food grain increased fourfold, from 50.82 million tons in 1950 to 1955 to 211.1 million tons in 2001 to 2002 (Yojana November 2003). Although the green revolution played a leading role in making the country self-sufficient in food grains, it created some adverse effects which were matter of serious concern. Negative impacts of the green revolution include excessive use of chemical (150-500 kb/ha), imbalance in nutrition status causing significant deficiency of Nitrogen, Phosphorus, Potassium and environment degradation like depletion of stratospheric ozone, nitrate toxic etc. causing health hazards like cancer, methemoglobinemia, respiratory illness hypertension etc.

Considering how health conscious consumers are becoming in both developing and developed countries, it is crucial to provide safe and quality food products. The world organic food market is estimated to grow to around US $110 billion annually in 2025 (Agriculture at a glance, Government of India, 2016). In Uttarakhand and Uttar Pradesh, 70% of land holdings are less than 100 acres in size and cover about 27% of the total agriculture land. Also, just over 3% of land holding are above 4 hectares in size. Small and marginal land holders are not able to apply technology and other resources efficiently making it difficult to make agriculture a profitable occupation as a result of higher input cost per unit of output (Government of Uttar-Pradesh, 2001). This paper evaluates the economic and environmental aspects of organic farming in

India. The remainder of the paper includes a literature review, data and methodology, results, discussion and conclusion.

LITERATURE REVIEW AND RESEARCH DEVELOPMENT

Total world land size is 13.4 billion hectares and total agriculture land size is 1.5 billion hectares. Table 2 shows that India agriculture land size is 1.18 million hectares. The total organically managed area worldwide is 50.9 million hectares while India's organically managed area is 4.78 million hectares. There were 2.3 million organic agriculture producers in the world in 2015. Table 1 shows India as number one of the largest producers of organic farming countries with 585,200 producers (FiBL survey, 2017). The international market for organic foods is expanding especially in the U.S., Europe and Japan. The grand viewresearch.com/press-release estimated the organic food market to equal US $ 77.4 billion in 2015. Moreover, it is estimated to generate revenue over USD 110 billion by 2025 with a growth rate of 42.12%. While generated revenue is increasing yearly, the economic impact of it on Indian farmers is low. This is due to increased number of farmers using small pieces of land to farm. Table 2 presents countries with the largest area of organic farming.

Table 1: Top Ten Countries with Largest Producers of Organic Farming (2015)

Countries	Producers (Thousands)
India	585.20
Euthopia	203.60
Mexico	200.04
Uganda	190.67
Philippine	165.96
Tanzania	148.61
Peru	96.86
Turkey	69.97
Paraguay	58.26
Italy	52.61

This table shows countries that have the largest number of organic farming producers. Sources: www.Fibl.org

Table 2: Countries with Largest Area of Organic Farming (2015)

Countries	Areas (Million Hectare)
Australia	22.69
Argentina	3.07
United States of America	2.03
Spain	1.97
China	1.61
Italy	1.49
France	1.38
Uruguay	1.31
India	1.18
Germany	1.00

This table shows countries with the largest land areas dedicated to organic farming. Sources: www.Fibl.org

Twentieth century's world agriculture has moved fast towards organic crops. The increased production of organic crops also resulted in increased agricultural exports, thereby increasing revenue and employment

opportunities (The Hindu in 2010). An important reason for the emphasis of organic farming in India is that most arable soils in India contain organic carbon below the threshold level.

A majority of the farming community in India is resource poor and the purchase of fertilizers and chemicals in adequate quantities is beyond their capacity. A large fraction of farm by-products is utilized for non-farm use such as fuel or other domestic purpose. Lack of location specific technology to recycle organic wastes and lack of awareness to recycle organic wastes in agriculture are the main reasons for slow adoption of organic farming even though it was a native technique for the farmers which got lost during the green revolution period. Some 1,000 million tons of animal dung is produced in India annually, which yields about 500 million tons of farm manure, an excellent source of plant nutrition. An application of 10 tons of well rotten Farm Yard Manure per Hector (FYM/ha) can add 50-60 kg K_2O (Potassium Oxide). A systematic research and development program that will sustain agricultural systems through organic agriculture needs to be initiated.

Wastes into Organic Manures

Cropping systems can be managed advantageously. Efforts should be made to maintain yield stability and suppress the weeds and pests through adoption of appropriate cropping systems. Weeds and pest's incidence can be minimized through the adoption of appropriate long-term crop rotation systems. Inter cropping of garlic with sugarcane minimizes the incidence of shoot borer. Periodical substitution of wheat with a fodder crop in a rich-wheat system is a remedy for phyllaries minor. Introduction of legumes as break crops in intensive cereal-cereal system results in yield stability and restoration of soil fertility.

Manure offers a significant opportunity to fertilize crops. Large quantities of wastes in the form of manure can be generated from poultry farms, which are mostly mixed with floor materials e.g. liter, droppings, dead birds etc. Floor materials refers to the bedding materials (saw dust, wheat straw and rice hulls) which get mixed with dropping/left over feed. The content of N, P, O and K_2O in the poultry litter varies between 3.0-4.0%, 2.0-2.5% and 1.0-2.0% respectively, depending upon the kind feed used. Poultry manure generally contains 38 g/kg of organic nitrogen, 4.8 g/kg of ortho-phosphorus and 20.9 g/kg of potash besides Ca, Na, Cu and Zn etc. in very small quantities (The Hindu Survey, 2005). The manure produced from poultry is estimated to be 17-20 kg of manure daily per 1000 kg broiler live weight. One adult chicken produces 25 kg of compost manure in one year.

Another source of organic fertilizer is vegetable waste. India grows about 20 million tons of vegetables and fruits annually. Out of these only 0.4% is utilized for domestic consumption and processing while the rest are treated as garbage. Little attempt has so far been made to exploit this waste as feed for fish. Properly processed vegetable leaves like cabbage carrot, cauliflower, radish, tomato etc. contain crude protein (8-20%), either extract (2-4%), crude fiber (11-20%) and (30-80%) nitrogen free extract on a dry matter basis which can be used as a supplement for formulated fish feed. Protein, fiber and nitrogen free extract of wastes from carrot, cauliflower, dehydrated pea karela (bitter million), onion, potatoes, spinach and tinda can also be used for preparing fish feeds (Xavier et. al, 2001).

Sericulture wastes are a mixture of silkworm feces, worm slough and mulberry leaves residues. Siriculture can serve as a nutrient medium and feed for fish ponds. A one-hectare mulberry plant can produce 4,000-6,000 kg of leaves, 1000 kg of silkworm wastes, which in turn can result in 125 kg of fish. Silkworm feces are also consumed by fish. The following areas for research and development under organic agriculture need attention. Research projects for formulation of organic farming practices should be formed and implemented as national project. Incentives for production of good quality organic manure, bio-pesticide, bio fertilizer and green manuring crops should be strengthened. Finally, development of pesticides of plants origin (such as neem) and use of agents especially under inter-grated pest management programmed system need to be promoted.

DATA AND METHODOLOGY

The study evaluates the economic and environmental aspects of organic farming in India. This paper is empirical in nature and the research is based on primary data. Six farmers who practiced organic farming in the Uttar Pradesh and Uttarakhand regions in 2010 were surveyed. A self-administrative pre-tested questionnaire was developed and administered to the respondents and used as the main data gathering instrument for the study (refer to the questionnaires given in Appendix A). The data collected was analyzed and presented below. Data on organic farming were collected from the state of Uttarakhand. The respondents reported to the author.

RESULTS

Table 3 presents the agricultural economic value of organic farming. Table 3 shows a farmer annually average income is Rs. 42,796.00 with standard deviation of Rs. 6,441.00 per year if farmer is performing organic farming.

Table 3: Agriculture Economic Value of Organic Farming

Name	Area in Acre (Reduced to 1 Acre, 1 Acre=43,545.72 Sq Feet)	Cost of Bio-Fertilizer in Rs (1 Acre)	Production of Rice Quintal/Acre	Economic Values in Rs. of One Crop Price 2,991.67/Qt	Economic Profit Values in Rs. of One Crop (After Cost Deduction)
Respondent 1	1 acre	2,500.00	12 qt.	35,900.00	33,400.00
Respondent 2	1 acre	1,875.00	16 qt.	47,867.00	45,992.00
Respondent 3	1 acre	2,000.00	14 qt.	41,883.00	39,883.00
Respondent 4	1 acre	2,100.00	14 qt.	41,883.00	39,783.00
Respondent 5	1 acre	2,000.00	16 qt.	47,867.00	45,867.00
Respondent 6	1 acre	2,000.00	18 qt.	53,850.00	51,850.00
Average	1 acre	2,079.17	15 qt.	44,875.00	42,796.00

This table shows the value of organic farming in India.

Table 4 presents the agricultural economic value of inorganic farming. Results show an inorganic farmer's annual average income is Rs. 36,733.33 with standard deviation of Rs. 6,333.851 per year. In Table 3, the cost of bio-fertilizers, as reported by various respondents, used per acre of land to produce rice is reported. The quantity of rice and the total cost of rice produced are also given. The cost of rice has been calculated at the present market rate of Rs. 2300.00 per quintal for inorganic farming and 2,991.67 per quintal for organic farming. Similarly, Table 4 shows the cost of inorganic fertilizers along with the total value of rice produced per acre. The analysis assumes that except for the cost of fertilizers, other costs like laborer, irrigation, seeds etc. remain the same in both the cases. Therefore, the last column in the tables shows the value of rice produced after deducting the cost of fertilizers. For bio-fertilizers, the average value of production per acre is Rs 44,875 while for inorganic fertilizers is Rs. 39,866.67.

It is evident that in inorganic farming, the value of rice production exceeds organic farming. At first glance it appears that organic farming is less productive. However, a few years after the start of organic farming in a given farm, the soil condition improve. Further, in organic farming, harvest residual of paddy and wheat are left in the field to make a good bio-fertilizer. Thus, with successive years of bio farming the need for additional bio-fertilizers decreases, thereby making bio farming more economical. The following are the motivational aspects of organic farming identified by the farmers in Uttar Pradesh and Uttarakhand:

Table 4: Agriculture Economic Value of Inorganic Farming

Name	Area in Acre (Reduced To 1 Acre, 1 Acre=43545.72 Sq Feet)	Cost of Fertilizer in Rs (1 Acre)	Production of Rice Quintal/Acre Price	Economic Values in Rs. of One Crop 2300/Qt	Economic Values in Rs. of One Crop (After Cost Deduction)
Respondent 1	1 acre	5,000.00	18 qt.	41,400.00	47,600.00
Respondent 2	1 acre	5,250.00	18 qt.	41,400.00	36,150.00
Respondent 3	1 acre	5,000.00	18 qt.	41,400.00	36,400.00
Respondent 4	1 acre	4,500.00	14 qt.	32,200.00	27,700.00
Respondent 5	1 acre	5,250.00	18 qt.	41,400.00	36,150.00
Respondent 6	1 acre	5,000.00	18 qt.	41,400.00	36,400.00
Average	1 acre	5,000.00	17.2 qt.	39,866.67	36733.33

This table shows the value of inorganic farming in India.

Environmental Motives: About fifty four percent of the farmers' responses could be broadly put under the motive environmental care or awareness of environmental safety and ill effects of hazardous practices followed in modern farming. It was amazing to find the farmers' awareness and care for environment. Their motto was complete health for all human beings.

Financial motives: Reduction in cultivation costs and increases in net profit were two important financial motives for switching to organic farming. Most inputs required for organic cultivation were derived from locally available sources like FYM, plants, herbs, etc. Utilizing these materials reduced input costs and increased net profit, notwithstanding a lower yield in initial years.

Soil health-oriented motives: Some respondents believed soil health has been deteriorated due to chemicals. The life of soil living micro-organisms and earth worms were disturbed by heavy dumping of fertilizers and chemicals.

Quality of output related motives: About one fourth of respondents found quality of output as their major concern to shift towards organic farming. Some organic farmers indicated an increase in product quality like vegetable and food grains motivated them to go organic. These farmers were very particular about the grade and standard of their harvest. They attributed their conversion to taste, durability, and freshness of the organic produce.

Motivation of Media: An equal percentage of farmers (24%) felt that the influence of and motivation from success stories through media like books, magazines, radio and TV programmers on organic farming, played a considerable role in changing their farming activities. Their ideology was formulated by being exposed to the media. PSK Sudheer (2013) found increasing costs of chemical inputs (63%) and increase in net return in organic farming (11%) were motivating factors towards organic farming. Fairweather (2000) found that the antipathy to chemicals and the degradation of soil were the main motivation. Xavier et. Al. (2001) found that that quest for healthier food was the main motivations for farmers bio farm. The Government of India (2016) found that about 8% farmers were motivated towards bio farming due to ideological reasons propagated by the media**.**

CONCLUSION/ CONTRIBUTION

The paper evaluates the economic and environmental aspects of organic farming in India. Data was collected from six farmers who practiced organic farming. The paper found that education seemed to be one of the most effective and compelling component for a farmer to ratify or endorse organic farming. Educated conventional farmers were aware of the health hazards of contaminated food, so they practiced

organic farming at least on a limited basis. Further, environment and financial motives were primary motives behind the farmers' conversion to organic farming. In addition to a net profit advantage of organic farming, other hidden environmental benefits of organic farming should also be identified to make it more influential and believable. For instance, if one agrees with organic practices' long-term benign effect, then it would strengthen their confidence in this emerging field.

The paper also found that reduction in cost of cultivation and increase in net profit were important financial motives to switch to organic farming. Most inputs required for organic cultivation were derived from locally available sources like plants and herbs. It reduced input costs and increased their net profit, notwithstanding a lower yield in initial years. Anand Kumar (1998) found increasing costs of chemical inputs (63%), increase in net return in organic farming (11%), as reasons behind the shift. The limitation of this research is the small number of participants in the study. In future research, a comparative study will be conducted using more organic farmers in the Uttar Pradesh and Uttarakhand regions to identify new developments.

APPENDIX

Appendix A: Economic and Environmental Aspects of Organic Farming Questionnaire

General Questionnaires			
1. Name:			
2. Father' Name:			
3. Address:			
4. Age:			
5. Sex:	Male-	Female-	
6. Main Occupation:			
7. Supplementary Occupation:			
8. Land size:			
Small	Marginal	Big	
9. Use of land:			
Agriculture			
Poultry			
Fishery			
Dairy			
Others			
10. Occupation wise:			
1. Agriculture:			
a. Crops Types:			
b. Farming Methods:	Organic	Inorganic	
11. If organic:			
	a.Total Input	b. Total Output	c.Profit
12. If Inorganic methods:			
	a.Total Input	b. Total Output	c.Profit
13. Others:			
	a.Total Input	b. Total Output	c.Profit

REFERENCES

Agricultural statistics at a glance, Govt. of India (2003).

Agricultural statistics at a glance, Govt. of India (2017), Directorate of Economics and Statistics, Department of Agriculture, Corporation and Farmer Welfare, Minister of Agriculture, Corporation and Farmer Welfare, Government of India.

Agricultural statistics at a glance, Govt. of India (2016), Directorate of Economics and Statistics, Department of Agriculture, Corporation and Farmer Welfare, Minister of Agriculture, Corporation and Farmer Welfare, Government of India

Alston, Julian M. et al., (2000), "A Meta-Analysis of Rates of Return to Agricultural R and D: Ex Pede Herculem". Washington, D.C. International Food Policy Research Institute.

Banerjee, A, (1995), Togetherness in Dairying, Indian Dairyman, Vol. 47 No. S.2-3, pp. 10.

Crosson, Pierre. (1995), "Soil Erosion and Costs, science 269:5223", pp 461-63.

Counting on Agroecology: (2015), Why We Should Invest More in the Transition to Sustainable Agriculture, union of concerned scientist, www.ucsusa.org

Department of Agriculture, Uttarakhand, Tenth Five-Year Plan 2002-07, and Annual Plan 2002-03.

Etienne, G. (1993), "Indian Village and Districts Revisited, The Issue of Economic Growth and Poverty", Indian Journal of Labor Economics, Vol. 36, No-2, April-June.

Economic Survey, Government of India, (2001), Ministry of Finance, Economic Division pp 150-155.

PSK Sudheer. (2013) Economics of organic versus chemical farming for three crops in Andhra Pradesh, India P. Sri Krishna Sudheer Tata Institute of Social Sciences, Tuljapur, Maharastra, India. *Journal* of *Organic Systems*, 8(2), 2013 ISSN: 1177-4258, Page 36-49https://www.organic-systems.org/journal/82/8205.

Ghosh, Souvik; Panda, D.K.; Nanda, P. and Kumar Ashwani. (2011). Links between irrigation, agriculture and level of living. Indian Research Journal of Extension Education. 11 (3): 32-36.

Hindustan Times, New Delhi, April 13, 2003

Hayami and Ruttan, (1970), "Agricultural Productivity: Difference Among Countries", American Economic Review. December, 60:S. pp. 895-911.

Indian Journal of Extension Education, (2004), A Major Success Story, S. Shanugarundaram Irrigation Management ICAR, RCER, Patna 28 September-7th October 2004. Yojana November 2001, pp.42

Joshi. P.K. (2010), "Conservation Agriculture: An Overview", Indian Journal of Agricultural Economics, 66(1): 53-63.

Kumar and Mathur, (1996), "Agriculture in Future: Demand-Supply Perspective for the Ninth Five Year Plan", Economic and Political Weekly, Vol. 31, No. 39, pp. A 133-139.

Kalam and Rajan, (2998), A vision for the New Millennium.

Organic Farming for Sustainable Agriculture: Global and Indian Perspective, (2014), Global Journal For Research Analysis, Volume: 3, Issue: 2, Page-57, -ISSN No 2277-8160, Feb-2014.

Ruttan, Vernon W. (1956), "The contribution of technological progress to farm output 1950-1975", Review of Economics and Statistic, pp 61-69.

R.K. Datta, Director (1996), "Central Sericulture Research and Training Institute", The Hindu Survey of Indian Agriculture, pp 127.

Singh, N. (2017). Economic Aspects of Diversification of Farm Sector: A study of India. Archives of Business Research, 5(4), 35-42

S. Ayyoppan, (1997), "Towards a blue revolution, Central Institute of Freshwater Aquaculture", Kausalyaganga, Bhubaneshwar, Orissa, The Hindu Survey of Indian Agriculture , pp. 118-119.

Singh P.K. (2002), "Next Phase of Economic Reforms: Strategies for Agriculture", Arth-Vikash, pp. 21-26, January-June.

Seeds of the Future: How Investment in Classical Breeding Can Support Sustainable Agriculture (2015), union of concerned scientist, www.ucsusa.org
The Hindu Survey of Indian Agriculture (2004), pp. 107

The Hindu Survey of India Agriculture, (1996), pp. 123

The World of organic agriculture Statistics & Emerging Trends (2017)
www.fibl.org/en/themes/organic-farming-statistics.htm

Xavier Irz, Lin Lin, Colin Thirtle, Steve Wiggins (2001), "Agricultural Productivity Growth and Poverty Alleviation", development Policy Review: 19:4. pp. 449-466.

Yojana November (2001), pp. 22and pp. 42.

BIOGRAPHY

Dr. Nisha Singh is an Assistant Professor at Livingstone College, Salisbury, NC. She has a Ph.D. in Economics. She collaborated with Quantum School of Business at Roorkee, P. K. Institute of Technology and Management, Agra, RCMCA Roorkee, and Galgotia Institute of Technology at Noida, India, where she published several articles and books with other researchers. She is currently working as the consulting director with 4Dcrossconnect.com and as the editor of 4D International Journal of Management and Science. Dr. Singh can be contacted at Livingstone College, Division of Business Administration, 701 W. Monroe Street, Salisbury, NC 28144.