



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

The role of demographic factors in adopting organic farming: A logistic model approach

Md Sikandar Azam¹, Dr. M. Banumathi²

1. Doctoral Fellow, Department of International Business, School of Management, Pondicherry University,
2. Associate Professor, Department of International Business, School of Management, Pondicherry University.

Manuscript Info

Manuscript History:

Received: 15 June 2015
Final Accepted: 26 July 2015
Published Online: August 2015

Key words:

Organic Farming, Organic vs Conventional Farmers, Sustainable Agriculture, Marginal Farmers, Logistic Regression, Agricultural Economics

*Corresponding Author

Md Sikandar Azam

Abstract

Organic farming is a system which avoids or largely excludes the use of synthetic inputs to the maximum extent feasible and rely upon crop rotations, crop residues, animal manures, off-farm organic waste (USDA). Despite numerous benefits of organic agriculture like environment, ecological and social, economic empowerment is one of the key challenges for the farmers to convert their farming. Sustainable livelihoods of the marginal and small farmers can be merely improved by strengthening their economic condition. This study examines the role of various socio-demographic factors in adopting organic farming. The fieldwork was carried in Nalanda district of Bihar where recently farmers has set a new world record in potato production i.e., 108.8 tonnes compare to 45 tonnes per hectares by Netherland. The primary data was collected through structured questionnaire consisting of total 160 marginal organic and conventional farmers. Logistic regression model has been applied to identify the factors influencing farmers to move towards organic farming. It revealed that educational attainment, age of the farmers and gender has positively influenced. However, family size and land ownership did not influence much. It is found that economic condition of organic farmers has been strengthened significantly which resulted better livelihood condition and training provided by the government to the farmers resulted more self-reliant and confident individuals. Organic farming creates atmosphere to face various challenges of marginal and small farmers.

Copy Right, IJAR, 2015,. All rights reserved

INTRODUCTION

Organic farming includes all agricultural systems that promote the environmentally, socially and economically sound production of food and fibers. A tremendous shift in demand of organic food especially from developed countries led numerous opportunities to many developing nations. Sustainable livelihood of marginal and small farmers has been a challenge for most of the agriculture dominated countries. India's 57 per cent populace still depends on agriculture and allied activities where more than 80 per cent farmers hold less than 2 acre (FAO) under marginal and small categories. Traditional agriculture in India was a kind of non-certified organic, and almost all practices and processes in these agro-ecosystems were compatible with organic agriculture, but it has not been certified as organic. Gradually, after Green Revolution use of chemical in farming became quite common practice in India. Despite bulk move from traditional to conventional farming; still many farmers especially in remote and rural part of India were using organic manure. In the last few decades, increase in consciousness among the consumers has provided a different recognition to the Organic Food. Gradually numerous organic movement were formed to provide and assure authenticity to the consumers. However, today certification procedure by the reputed organization made convenient for the consumers to differentiate between organic and conventional foods, thereby commercialization of organic food started.

Green Revolution and its impact

Green Revolution of India has changed drastically the food grain production which enabled to become self-sufficient as well as surplus too. Agriculture production was almost doubled compare to the post green revolution period with the same cultivable land size i.e., 95 million tonnes (mt) in 1967 to 256 million tonnes in 2013. After green revolution farmers started using more chemical and fertilizers which affected not only agricultural land but also the ultimate consumers. Various studies have been conducted so far from the science perspective which reflects how chemical farming directly affects health condition of soil, human body as well as environment and the ecosystem. Further it is concluded that agricultural soil becoming unproductive due to excessive use of chemical for a long period.

Agricultural Land holding pattern in India

The last four decades has witnessed a sharp decline in the average size of operational land holdings in India. This is reflective of the immense population pressure on the limited land resource available for cultivation. NABARD has classified the farmers into three categories as Marginal, Medium and Small. Marginal farmers are owner or tenant or share crop or holding agriculture land up to 1 hectare which is 2.5 acres. People with 5 acre land are called as small farmers. The average land holding size of Indian farmers is presented in the graph below. It reveals the fact that in all states the land holding has declined in these years.

Of which the numbers of marginal farmers were increased from 9% to 22% in these past four decades. In other hand the medium and large farmer's pie is shrinking. In Bihar and Kerala, the average size of holding fell by more than three times during the last four decades, whereas in Andhra Pradesh, Karnataka, Madhya Pradesh and Maharashtra, it has reduced into half. Interestingly it is observed that the land used for organic farming has increased in these states. Therefore, we can conclude that movement from conventional to organic farming is getting momentum.

REVIEW OF LITERATURE

Charyulu et al., (2010) examined that the unit cost of production is lower in organic farming in the cases of cotton and sugarcane (compared to chemical farming), whereas it is higher for paddy and wheat. Raj et al. (2004) studied in Andhra Pradesh on cotton cultivation and concluded that the profitability of organic cotton was significantly higher than chemical cotton. M S Azam (2015) found that organic farmers were more aware and close to the mainstream whereas conventional farmers are still lacking in many aspects. Matt Lobley (2009) confirmed that the people who operate organic farms are typically younger and educated than their non-organic counterparts and a significant proportion have entered agriculture as an entirely new 'career'. M.K. Lwayo (2003) highlighted that policy implementation should be concentrated at the district level to bring it closer to the people. Formal education is vital in promoting farm forestry. Problems experienced during conversion relate to lack of governmental and institutional support and less use of chemicals and improved food quality were highly ranked as benefits. Sammy Comer et al., (2008) highlighted that organic farmers achieved higher score on sustainable agriculture compared to conventional farmers. The results also show that farmers' affiliation with different organization/groups does affect their perception about organic agriculture. Ramesh et al., (2010) found that despite reduction in crop productivity, net profit of organic farming was recorded high due to the availability of premium price for the certified organic produce and reduction in the cost of cultivation. The net return and profit with or without "Price Premium" has been consistently a debatable issue. The author has studied the economic viability of organic farming in the same district and found that it is profitable. However, the recent new World Record of highest production per hectare of potato and onion from Bihar, India (ahead of China and Netherlands) through organic farming has substantiated the argument and the government has implemented various policies and reforms to support the same. Therefore this study made an attempt to understand the demographic background of the farmers in Nalanda district of Bihar to identify the reasons for the move from conventional to organic farming.

Objectives of the Study

The major objectives of this study are:

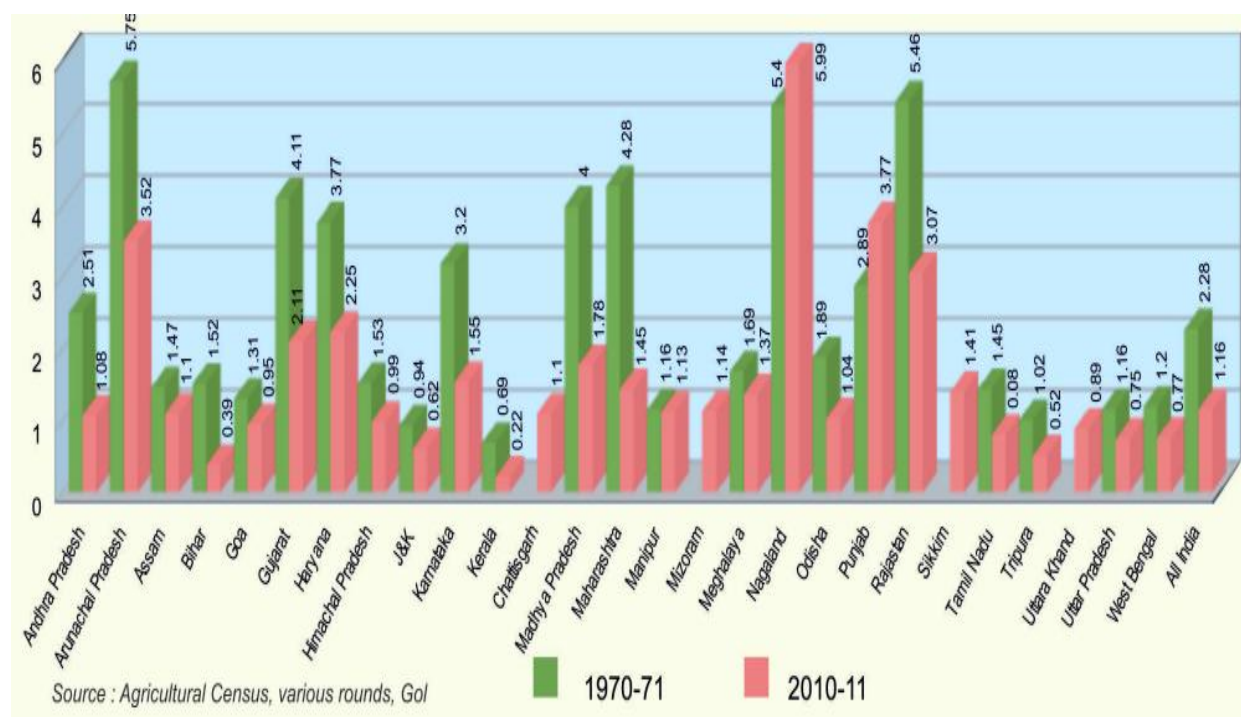
- To understand the demographic background of organic and conventional farmers
- To explore the relationship between Education level, Farming experience and size of Land ownership with organic farming and
- To identify the demographic factors influencing the farmers towards organic farming.

METHODOLOGY

This study is based on primary data was collected from the marginal farmers (holding/cultivating less than 2.5 acre =1 hectare = 20 Kattha) of District of Nalanda, Bihar with the help of structured questionnaire and interview method. The organic and conventional farmers of 80 each (total 160) were considered for this study. Only certified organic farmers were included. Correlation and Analysis of Variance (ANOVA) has been used to analyze the data. Further, Logistic regression model was applied to understand the association and the impact of demographic variables on adoption of organic farming practices.

RESULTS AND DISCUSSION

Graph 1: State-wise average size of Land Holdings (in hectare)

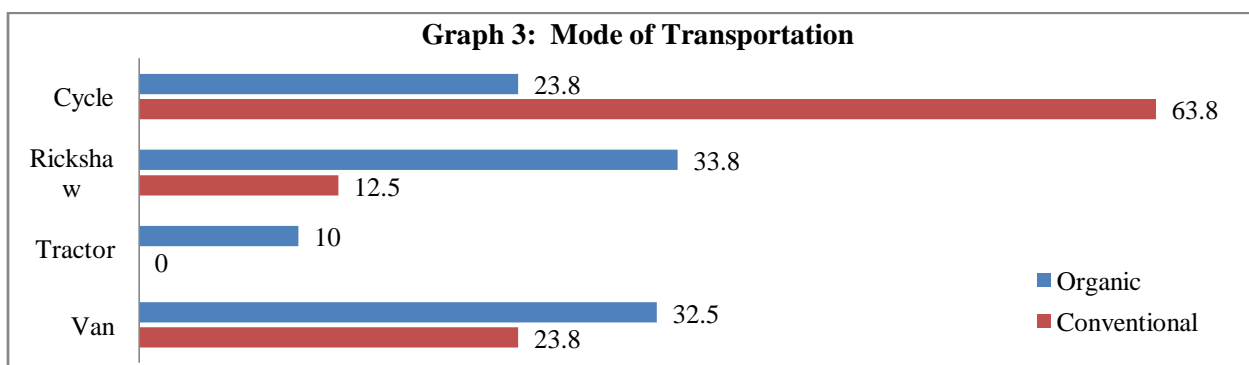
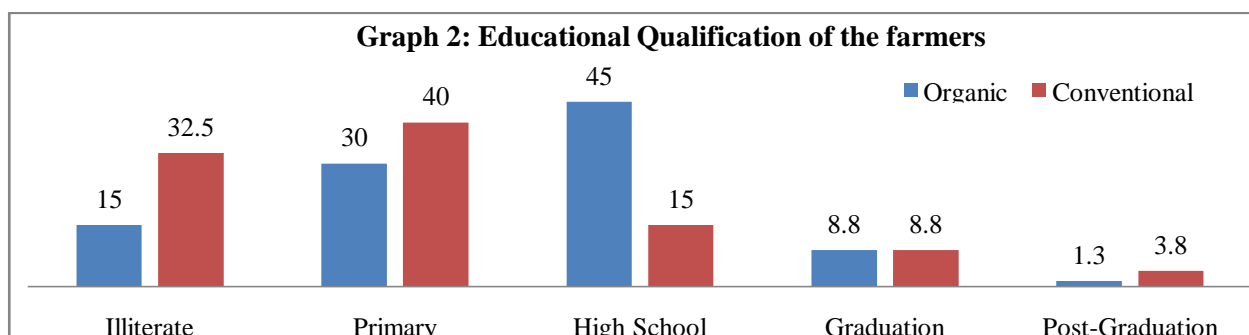


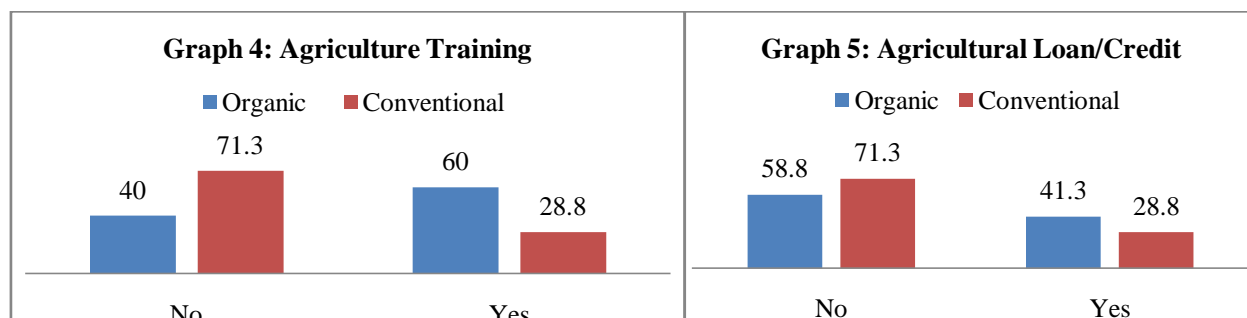
From the analysis it is found that most of the farmers involved in agriculture are married men. The Average age of the farmers lies between 45 to 50 years with the large family size (6-10 members) out of which only one person engaged in farming. In the study area most of them (90 per cent) moved to organic farming in 2009. Further, their access to the banking facilities, agricultural training, electronic accessories and mode of transport has improved (Table I) due to their conversion. From the demographic profile it can be inferred that most of the conventional farmers are underprivileged and unable to access their basic requirement whereas, organic farmers are substantially better.

From the graph it can be inferred that organic farmers are more educated (32%) than conventional farmers (15%) and more than 60 per cent conventional farmers use Cycle as a means of transportation whereas, majority of the organic farmers use Rickshaw, Van and Tractors. Further, around 20 percent conventional farmers sold their crops directly to the consumers whereas organic farmers sold to Village and Town Traders. Moreover, 60 per cent organic farmers are trained whereas more than 70 per cent conventional farmers are not trained. More than 40 per cent organic farmers access loan facility and only 28 per cent of others. More organic farmers own and hold leased land than conventional farmers. There were no differences in terms of farming experience among both groups.

Table – I Demographic Profile of the farmers

Particulars	Organic Farmers (N = 80)		Conventional Farmers (N = 80)		
	Farmers	%	Farmers	%	
Gender	Male	76	95.0	67	83.8
	Female	4	5.0	13	16.3
Marital Status	Single	8	10.0	5	6.3
	Married	72	90.0	75	93.8
Family Type	Nuclear	50	62.5	40	50.0
	Joint	30	37.5	40	50.0
Age of Farmers	Less than 21	6	7.5	2	2.5
	21-40	17	21.3	24	30.0
	41-60	39	48.8	35	43.8
	More than 61	18	22.5	19	23.8
Size of the Family	1-5 members	24	30.0	21	26.3
	6-10 members	48	60.0	41	51.3
	11-15 members	8	10.0	18	22.5
Family Member Involve	1 member	70	87.5	67	83.8
	2 members	9	11.3	13	16.3
	3 members	1	1.3	0	0
Land ownership (cultivation)	Own Land	45	56.3	40	50.0
	Leased Land	14	17.5	10	12.5
	Both Own & Lease	21	26.3	30	37.5
Farming Experience	Less Experience	19	23.8	16	20.0
	Average Experience	24	30.0	28	35.0
	High Experience	37	46.3	36	45.0
Access Newspaper/Radio	None	21	26.3	52	65.0
	Radio	9	11.3	7	8.8
	Newspaper	50	62.5	21	26.3
Selling crops	Direct to Customers	1	1.3	17	21.3
	Village Traders	41	51.3	37	46.3
	City/Town Traders	38	47.5	26	32.5



**Table - II Pearson Correlation Results**

Correlations	Educational Qualification	Land Holding Pattern	Farming Experience	Organic Farming
Educational Qualification	1	.087	-.378**	.199*
Land Holding Pattern		1	-.097	-.098
Farming Experience			1	-.016
Organic Farming				1

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

From the above results it is inferred that there is a negative relationship between educational qualification and farm experience whereas; Educational qualification with Organic farming is significant. The hypothesis framed for this study is given below:

1. H_{01} : There is a no significant difference between Farmer's Experience and conversion to Organic farming practices.
2. H_{02} : There is a no significant difference between Type of Land holding (Cultivation) and conversion to Organic farming.
3. H_{03} : There is a no significant difference between Educational Qualification of farmers and conversion to Organic farming.

Table III - ANOVA test Results

Hypothesis	Variables	df	F	P - Value	Significance Level
1	Farm Experiences	2	0.285	0.752	Not Significant
2	Land holding pattern	2	1.271	0.283	Not Significant
3	Educational Qualification	3	5.316	0.000	Significant

Above analysis shows farm experience and land holding pattern are not influenced the farmers towards their conversion but in other hand Educational qualification has influenced significantly.

Table - IV Post Hoc Test (Duncan results)

Educational Qualification - Duncan ^{a,b}	N	Subset for alpha = 0.05	
		1	2
Illiterate	38	.32	
Primary	56	.43	
Graduation and above	18	.44	
High School	48		.75
Sig.		.304	1.000

Means for groups in homogeneous subsets are displayed.

a. Uses Harmonic Mean Sample Size = 33.178.

b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.

Homogeneous sub set of Multi comparisons Duncan test shows that High School group is significantly different from other groups.

Logistic Regression Model

Logistic regression works very similar to linear regression, but with a binomial response variable. The equation is derived as below.

$$\log\left(\frac{\pi}{1-\pi}\right) = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \beta_5x_5 + \beta_6x_6 + \beta_7x_7 + \beta_8x_8$$

Where, π is the probability of adoption of organic farming expressed in terms of the variables used in this example. β_1x_1 value of independent variable to estimate the dependent variable.

Table V - Model Summary

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
194.212 ^a	.158	.211

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

The above mentioned “Cox & Snell R² and Nagelkerke R² reflects pseudo R-squares which is 0.158 and 0.211 respectively. The outcome of the model indicates that the demographic variables included in this study accounts for 16 to 21 percent explanation for adoption/non-adoption of organic method of farming.

Table -VI Logistic Regression result

Variables	X _i	B	S.E.	Exp(B)
Gender	X ₁	1.536	.642	4.64**
Age	X ₂	0.897	.372	2.45**
Family type	X ₃	-0.999	.478	0.37**
Education	X ₄	0.517	.211	1.68**
Marital status	X ₅	-1.875	1.011	0.15*
Family size	X ₆	-0.381	.335	0.68
Farm type	X ₇	-0.403	.284	0.67
Family profession	X ₈	1.062	.570	2.89*
Constant		-1.678	1.190	0.187

a**significant at P<0.05, *P<0.10

The derived equation is as follows:

Organic Adoption

$$= -1.678 (\text{Constant}) + 1.536 (\text{Gender}) + 0.897 (\text{Age}) - 0.999 (\text{Family type}) + 0.517 (\text{Education}) - 1.875 (\text{Marital Status}) - 0.381 (\text{Family size}) - 0.403 (\text{Family type}) + 1.062 (\text{Family profession})$$

The results revealed that the educational attainment has positively and statistically significant on the adoption of organic method of cultivation. An educated farmer seems to be positive in adoption of organic farming than others. Further, odds ratios “Exp(B)” explain that decision with regard to the adoption of organic farming is likelihood to increase by 1.68 times with the improvement in education level of the farmers. With respect to the gender and age, the logistic regression coefficient reflects that men with above average age are positively significant in adoption of organic farming and for every one unit increase likelihood resulted by 4.64 and 2.45 times. Whereas, family type (nuclear/joint) of the farmers negatively related. Regarding the adoption of organic farming, whether agriculture is family profession or not, Marital status of the farmers influenced negatively. Other independent variables associated in this model, family size and farm type (ownership of land like, leased, own and both type of land) did not influence statistically.

Suggestions

It is evident that the level of education plays a major role in influencing the farmers to move towards organic farming irrespective of their farm size and experience. Therefore there is need to create awareness among the farmers regarding the sustainability and profitability of organic farming. Government can play critical role in motivating the farmers towards organic farming by assuring their losses especially during the conversion period in the form of compensation or subsidies. Further, government should provide advisory/expert services to deal with the crops disease, proper use of organic manure, certification issues and establish group of farmers to uplift the concept of “community farming” which reduces overall cost of cultivation too.

CONCLUSION

Organic farming has experienced considerable growth in recent years. Proponents of organic farming point to the environmental and nutritional benefits of the system. Further it can provide rural development through enhanced employment and closer connections with the local economy, reconnecting consumers with producers and stimulating positive economic multipliers (Matt Lobley 2009). The Study found that around 90 per cent farmers converted their farming into organic in 2009 and their socio-economic condition seems to be changed along with community farming. Organic farmer's economic condition has been strengthened which resulted in improving their livelihood condition by accessing day to day requirement. Training provided by the government to the farmers resulted more self-reliant and confident individuals, to stand up for their democratic rights in the midst of the formidable power of globalized corporate agriculture.

References:

1. Ahmad S. N. B., Juhdi N. (2010) Organic Food: A study on demographic characteristics and factors influencing purchase intentions among consumers in Klang Valley, Malaysia. *International Journal of Business and Management* Vol. 5(2) 106-118
2. Demiryurek, K. (2008), Economics of organic and conventional hazelnut production in the Terme district of Samsun, Turkey. *Renewable Agriculture and Food Systems*, 23(03).
3. Government of India (2010), *Agricultural Statistics at a Glance*, Directorate of Economic and Statistics, Ministry of Agriculture, Government of India.
4. Government of Bihar (2014) "Economic Survey 2013-14" Agriculture and allied activities. Department of Finance, Government of Bihar, India
5. Kafle, B. (2011). Factors Affecting Adoption of Organic Vegetable Farming in Chitwan District, Nepal. *World Journal of Agricultural Sciences*, 7(5), 604–606.
6. Kassie, M., Zikhali, P., Manjur, K., & Edwards, S. (2009). Adoption of Organic Farming Techniques: Evidence from a Semi-Arid Region of Ethiopia. *Environment for Development*, EFD DP 09-01 (January), 19.
7. Kshirsagar, K G. (2008): Impact of Organic Farming on Economics of Sugarcane Cultivation in Maharashtra. Gokhale Institute of Politics and Economics, Pune.
8. Kumara Charyulu D. and Subho Biswas (2010), Efficiency of organic input units under NPOF scheme in India, Working paper (April), IIM - Ahmedabad, India
9. Lampkin L.H and Padel S. (1994), *The economics of organic farming – An international perspective*, CAB International Publishers.
10. Läpple, D., & Rensburg, T. Van. (2011). Adoption of organic farming: Are there differences between early and late adoption? *Ecological Economics*, 70(7), 1406–1414.
11. M SAzam (2015), The influence of socio-demographic factors in adopting organic farming practices, *International Journal of Interdisciplinary and Multidisciplinary Studies (IJIMS)*, Vol 2, No.5, pp. 8- 17.
12. M.K. Lwayo and H.K. Maritim (2003), Socio-economic factors affecting farmers' decisions to adopt farm forestry: An application of Multivariate Logistic analysis In Busia district, Kenya, XII world forestry congress, Quebec City, Canada.
13. McEachern M.G., McClean, P. (2002). Organic purchasing motivations and attitudes: are they ethical?. *International Journal of Consumer Studies* 26(2) 85-92
14. Matt Lobley, Allan and Matt Reed (2009), The contribution of organic farming to rural development: An exploration of the socio-economic linkages, *Land Use Policy* 26, 723–735
15. Michael Wood (1998), Socio-economic status, delay of gratification, and impulse buying, *Journal of Economic Psychology* 19, 295-320
16. Padel, S. (2001). Conversion to Organic Farming: A Typical Example of the Diffusion of an Innovation? *Sociologia Ruralis*, 41(1), 40–61.
17. Raj, D. A., Sridhar, (2004). Case study on organic versus conventional cotton in Karimnagar, AP, India. 2nd International Symposium on Biological Control of Arthropods.
18. Ramesh, P., Panwar, N. R., Singh, a. B., Ramana, S., Yadav, S. K., Shrivastava, R., & Rao (2010), Status of organic farming in India. *Current Science*, 98(9), 1190–1194.
19. Ramesh, P., Singh, Mohan and Rao, A.S. (2005) Organic farming: Its relevance to the Indian context. *Current Science*, 88:561-68.
20. Rezvanfar, A., Eraktan, G., & Olhan, E. (2011). Determine of factors associated with the adoption of organic agriculture among small farmers in Iran. *African Journal of Agricultural Research*, 6(13), 2950–2956.

21. Saba A., Messina, F. (2003). Attitudes towards organic foods and risk/benefit perception associated with pesticides. *Food Quality and Preference* 14, 637-645
22. Seyfang, G., 2006. Ecological citizenship and sustainable consumption: examining local organic food networks. *Journal of Rural Studies* 22 (4), 383–395
23. Shirsagar KG (2008) “Impact of Organic Farming on Economics of Sugarcane Cultivation in Maharashtra”, Working Paper No.15, Gokhale Institute of Politics and Economics, Pune
24. Singh, IP, & Grover (2011), Economic viability of organic farming : An empirical experience of wheat cultivation in Punjab. *Agricultural Economics Research*, 24 Dec, 275–281.
25. Sudheer, P. S. K. (2013). Economics of organic versus chemical farming for three crops in Andhra Pradesh, India, *Journal of Organic Systems*, 8(2), pp. 36–49.
26. Thakur and Sharma, K. D. (2005) Organic farming for sustainable agriculture and meeting the challenges of food security in 21th century: An economic analysis. *IJAE*, 60:205-19.
27. Thapa, G. B., & Rattanasuteerakul, K. (2011). Adoption and extent of organic vegetable farming in Mahasarakham province, Thailand. *Applied Geography*, 31(1), 201–209.
28. Uusitalo L. (1990). Consumer preferences for environmental quality and other social goals, *Journal Consumer Policy* 13, 231-251
29. Yadav C.P.S., Harimohan Gupta, Sharma (2010), Organic Farming and Food Security: A Model for India, Organic Farming Association of India.
30. Yusuf Celik and David R. Hotchkiss (2000), The socio-economic determinants of maternal health care utilization in Turkey, *Social Science & Medicine* 50, 1797-1806