Research Paper *IJBARR*
Impact Factor: 4.729 *E- ISSN -2347-856X*
Refereed, Listed & Indexed *ISSN -2348-0653*

ROLE OF SUSTAINABLE FARMS IN MAINTAINING RIGHT TO NATURAL RESOURCES

Dr.R.Kasthuri
Assistant Professor of Economics, Department of Economics, Dharmapuram Athinam Arts Collage Dharmapuram, Myiladuthurai.

Abstract
In recent years, increases in agricultural productivity have come in at the expense of deterioration the natural resource base on which the farming systems depend. It is very urgent that this trend be reversed by encouraging farmers to adopt more sustainable methods of farming that will have long-term benefits in environmental conservation and development of sustainable livelihoods. Sustainable Natural Resources Management (NRM) optimizes the use of resources to meet current livelihood needs, while maintaining and improving the stock and quality of resources so that future generations will be able to meet their needs. At the same time, this method helps to protect the right to natural resources of both farming community and general public. The study tries to analyze the role of farmers in maintaining the natural resources and protecting the right to natural resources. Specific objectives of the paper are to examine the extent to which organic inputs maintain the natural resources, land and water; to analyze the factors that contribute to the present level of sustainable farm practices; and to suggest measures to increase the rate of use of sustainable farm inputs. This study uses both primary and secondary data. Primary data are collected from 323 select farm households from S. Puthur, Budhalur, Kandiyur and Eachengudi villages of Thanjavur district. Secondary data are collected from the electronic and print sources of Departments of Agriculture and Revenue of Government of Tamilnadu. Collected data are analysed with the help of statistical tools like bivariate tables, percentages, averages, multiple linear regression and ANOVA. It is expected that the findings and suggestions of the study would improve the status of the right to natural resources of the stakeholders of the region concerned.

Keywords: Sustainable Agricultural, Organic input, Sustainable Farming Practices, Awareness.

Introduction

In recent years, increases in agricultural productivity have come in at the expense of deterioration the natural resource base on which the farming systems depend. It is very urgent that this trend be reversed by encouraging farmers to adopt more sustainable methods of farming that will have long-term benefits in environmental conservation and development of sustainable livelihoods. Sustainable Natural Resources Management (NRM) optimizes the use of resources to meet current livelihood needs, while maintaining and improving the stock and quality of resources so that future generations will be able to meet their needs. At the same time, this method helps to protect the right to natural resources of both farming community and general public. Steadily growing public concerns about pesticides, food safety, environmental quality, groundwater contamination, dependency on finite supplies of fossil fuels and soil and water conservation have led many farmers and researchers to consider alternative means of agricultural production - generally labeled sustainable agriculture. Practices commonly associated with sustainable management include, reduced use of chemicals and fossil fuels, maximum use of on-farm inputs, crop nutrient recycling, and increased use of diversified crop rotations that enhance soil cover and fertility (Rajendern and kasthuri 2013).

Brief Review of Literature

There are many studies available worldwide on sustainable agriculture. Some of illustrative studies are given below: Rigby and Careres (2001) examined the sustainable agriculture, although there is still no consensus on this more specific aspect of sustainability. But organic farming and sustainable agriculture are synonymous; others regard them as separate concepts that should not be equated. The relationship between organic agricultural system and agricultural sustainability mean is a problem when discussing the relationship between them. Hirajhamtani (2007) observed alternative or sustainable agriculture practices are often not new but draw on traditional knowledge and practices. Some of which have now been positively evaluated by scientific methods. The principles of sustainable agriculture are a practice of various techniques like principles ranging from

Integrated Pest Management (IPM) to perm culture, to agro ecological system and similar study arrivals for the above same observation Dahama (1996). Siddiq and Pillai (1996) sustainable rice farming systems are integrated pest management practices for sustained rice production. Surekha et al and Central for India Knowledge System (2008) study was organic rice practices to meet nutrient requirement and pest management in natural methods. Rao and Sankar (2001) observed that the effect of organic manure on leaf number, leaf area index, dry matter production, and other growth characters was significantly better than those of inorganic fertilizer in brinjal. Surekha (2007) revealed that a gradual increase in grain yield with the use of organic fertilizers over a period of time was observed. Chan et al (2008) showed that the input of organic rice production in three different regions was 46, 25, and 22 per cent higher than conventional rice production, but rice yield was only 55, 94, and 82 per cent of conventional rice production, respectively. Tamaki et al (2002) reported that the growth of rice was better under continuous organic farming than with conventional farming. Agro-economic study of practices of growing maize with compost and liquid manure top dressing in low-potential areas showed significantly better performance than those of current conventional farmer practices of a combined application of manure and mineral fertilizers. Stockdale et al (2001) examined that the benefits of organic farming to developed nations (environmental protection, biodiversity enhancement, and reduced energy use and CO2 emissions) and to developing countries (sustainable resources use, increased crop yield without over reliance on costly inputs, and environmental and biodiversity protection). Laxminarayana and Patiram (2006) concluded that the decline in soil reaction might be due to organic compounds added to the soil in the form of green as well as root biomass which produced more humus and organic acids on decomposition. Observed that the sustainable organic farming practices significantly enhance the sustainability of the environment, farms and livelihood of the farmers but certain constraints diminished the adoption of sustainable organic agricultural practices. Above studies indicate the importance of sustainable agriculture and their benefits in short. Most studies suggest the way in which the sustainable agriculture is extended. Farmers should be motivated to rectify the imbalances and look for sustainable practices, eco-friendly practices which can maintain the soil fertility intact and at the same time increase productivity. The practices which support the use of low cost input will sufficiently increase profit of the farming and income of agricultural sector.

Definitions of Sustainable Agriculture

FAO (1992) defined sustainable agriculture and rural development, at the Earth Summit in Rio de Janeiro, as "the management and conservation of the natural resource base and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry, and fisheries sectors) conserves land, water, plant and animal genetic resources, is environmentally non-degrading, technically appropriate, economically viable and socially acceptable". Later, FAO (1995) redefined the sustainable agriculture and rural development on the basis of its process criteria as, "ensures that the basic nutritional requirements of present and future generations, qualitatively and quantitatively, are met while providing a number of other agricultural products; provides durable employment, sufficient income, and decent living and working conditions, for all those engaged in agricultural production; maintains and, where ever possible, enhances the productive capacity of the natural resource base as a whole, and the regenerative capacity of renewable resources, without disrupting the functioning of basic ecological cycles and natural balances, destroying the socio-cultural attributes of rural communities, or causing contamination of the environment; and reduces the vulnerability of the agricultural sector to adverse natural and socio-economic factors and other risks, strengthens and self-reliance".

Sustainable Farm Practices

Although sustainable agriculture does not refer to a standard set of agricultural practices, there are certain methods or practices that enhance sustainability (Horrigan et al. 2002). Such methods are regarded as sustainable agricultural practices. There is a wide array of sustainable agriculture practices that are being employed by farmers. Some of the most commonly mentioned in the literature are crop rotation, cover crops, no-till and low-till farming, soil conservation, diversity, nutrient management, integrated pest management, rotational grazing, maintaining water quality and wetlands, agro-forestry, and alternative marketing (SARE 2003; Horrigan et al. 2002).

The present sustainable agricultural farm practices indicate the farm practices which reduces use of natural inputs such as water; limiting the use of seeds, selecting pest resistant crop varieties; reducing the use of chemical inputs like various fertilizer, pesticides, weedicide and fungicide; applying natural inputs like farmyard manure, green manure, and bio-fertilizer; following practices that can conserve water and soil, allowing and facilitating (as bio-control measure) natural enemies against the pests, rats, etc.

Objectives of the Study

Present study has the following specific objectives: i) to examine the extent to which organic inputs maintain the natural resources, land and water; ii) to analyze the factors that contribute to the present level of sustainable farm practices; and iii) to suggest measures to increase the rate of use of sustainable farm inputs.

Materials and Method

Cauvery Delta zone is regarded as the rice bowl of Tamilnadu, which is one among the many advanced agricultural states in India. Majority of the agricultural lands are used for paddy cultivation, which is the staple food crop of south India. The study area has good natural inputs – soil, water, climate and specialized agricultural labourers. River Cauvery and its branches provides water potential and soil fertility to this area since very long time. Above said facts indicate the importance of paddy cultivation in resource endowed Cauvery delta region. To understand the levels of sustainable farm practices implemented by the farmers, factors influencing it and impact of such practices on income of the farms are essential. Ultimate sample units of the study are farm households. To select sample farm households, a multi-stage random sampling method has been employed. The stages of sampling are district, taluk (a district revenue division), village and farm household. At the first stage, Thanjavur district is selected among six delta districts. In the second stage, four out of eight taluks viz. Thanjavur, Thiruvaiyaru, Papanasam and Thirvidaimaruthur have been selected at random. One revenue village from each taluk has been selected in the third stage, again on a random basis. Name of the selected villages on a random basis are Budalur, Kandiyur, Eachengudi, and S.Pudur. Following is the village-wise sample distribution: 100 from Budalur, 67 from Kandiyur, 104 from Eachengudi, and 52 from S.Pudur. Total number of sample units for the study becomes 323, which is grouped as marginal (up to 2.50 acres land holding), small (2.51 to 5.00 acres), medium (5.00 to 10.00 acres) and large farms (10.01 acres and above). Number of sample farmers from each group is 136, 105, 51 and 31, respectively. . The study is based on both primary and secondary data. Primary data have been collected with the help of interview schedule. Important primary data collected for the study are land holding particulars, cropping pattern, sustainable farm practices for paddy cultivation, levels of awareness on sustainable agriculture, etc. Secondary data have been collected from the district administrative office, village administrative offices, and agricultural offices at village and district levels. Further, relevant materials from journals and books are also used for the study. Statistical analysis Data collected from the above said sources are analyses with the help of simple uni-variate and bi-viarate techniques like tables, averages, percentages, standard deviation, multiple linear regression and ANOVA.

Results and Discussion

Following section of the paper provides analysis and discussion made on the primary data collected through the field survey. As reported earlier, the study covered 323 sample farmers from a select village in the Cauvery delta. Before going to main analysis it is important to study the background of the respondents, farm size groups, and nature and type of land ownership of the sample farms. Season wise use of organic practices and level of awareness of the farmers on sustainable agricultuer. Table 1 sample according to land size of villages.

Table :1 Distribution of Sample Farmers according to Land Size of Study Villages

Name of Villages	Marginal	Small	Medium	Large	All farms	Percentage
Budalur	40	38	14	8	100	31
Eachankudi	47	33	16	8	104	32
Kandiyur	27	19	13	8	67	21
S.Puthur	23	14	8	7	52	16
Total	137 (42)	104 (32)	51 (16)	31 (10)	323 (100)	100

Source: Field Survey; Note: Figures in parenthesis indicate percentage to row total.

As mentioned in methodology the study covered 323 sample farmers under the survey. The farmers belong to four sample villages have different size of lands holdings. For the analytical convenience, the farmers are grouped as *marginal* (having up to 2.50 acres land), *small* (2.51 to 5.00 acres), *medium* (5.00 to 10.00 acres) and *large* (10.01 acres and above). Table 5.1 illustrates the distribution of sample farmers according to the sample villages and land holding groups. Number of sample farmers belong to Budalur is 31, Eachankudi is 32, Kandiyur is 21 and S.Puthur is 16. Normally, villages are unequal in terms of geographical area, number of farmers, size of cropped area and cropping pattern. These are the main reasons for being unequal number of sample units selected from sample villages under this study. At the same time, the distribution of sample farms according to land holding size also varies widely. Normally, there is a skewed distribution of land holding pattern prevails in India. Thus, the percentage of marginal, small, medium and large farms selected proportionally as sample is 42, 32, 16 and 10, respectively.

Table 2: Type of Land and Nature of Ownership (in acres)

Type of Land	Marginal	Small	Medium	Large	All
Own Land					
Wet	1.45 (96)	3.80 (77)	6.72 (45)	13.36 (30)	4.59 (247)
Garden	0.55 (6)	1.83 (3)	0.91 (9)	2.39 (14)	1.64 (32)
Total	1.50 (96)	3.81 (77)	6.95 (45)	14.41 (31)	4.79 (247)
Leased-in Land					
Wet	1.49 (51)	3.23 (36)	4.82 (15)	4.57 (7)	2.72 (109)
Garden	0 (0)	0 (0)	1.50 (1)	0 (0)	1.50 (1)
Leased-out Land					
Wet	2.01 (3)	5.00 (2)	3.00 (1)	0 (0)	3.17 (6)
Garden	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total Operational Holding					
Wet	1.58 (137)	3.88 (104)	7.46 (51)	13.96 (31)	4.43 (323)
Garden	0.62 (4)	1.83 (3)	1.27 (11)	2.57 (13)	1.70 (33)
Total	1.58 (137)	3.89 (104)	7.74 (51)	15.09 (31)	4.59 (323)

Note: 1. Figures in parenthesis indicate number of farm households.
2. Total operational holding= [Own Land + Leased-in Land] – [Leased– out Land].

Nature of Land Ownership

Average size of operational holding (own land *plus* leased-in land *minus* leased-out land) of farmers becomes 1.58 acres for marginal, 3.89 acres for small, 7.74 acres for medium, and 15.09 acres for large farmers. It is calculated as 4.59 acres, when we take all farmers together. In the total operational holding, 81 per cent is own land, 20 per cent is leased-in land and 1 per cent is leased-out land. There is a negative association between farm size and proportion leased-in land to the total operational holding. It means that the farmers with smaller land holding cultivate more of leased-in land, and farmers with larger land holding operate less of leased-in land. Farmers usually get lease land for cultivation from two sources: mostly from temple trust and from private land owners.

They cultivate this lease-in temple trusts lands for generation after generation, just like own land. Rent paid by them is mostly in kind (in terms of paddy) form. Land ownership details also given table 2.

Soil Problems

Rate of application of organic fertilizers directly related with soil problems. For the land reclamation farmers may use more amount of fertilizer. In the total holding, only one per cent of land is affected by salinity problem. However, 21 per cent of the farmers reported that their lands have inadequate drainage facilities, and 2 per cent of the farmers reported that they have no drainage facilities at all.

Cropping Pattern

Farmers cultivate major crops like paddy, sugarcane, pulses, oil seeds, banana, and some other minor crops like fruits, vegetables and flowers. Paddy is a dominant crop in this area. It is cultivated in three season's viz. *kuruvai* (by 23 per cent of the farmers), *thaladi* or *samba* (100 per cent) and *kodai* (11 per cent). Average areas under paddy cultivation during these seasons are 4.36, 3.94 and 5.29 acres, respectively. Nearly 7 per cent of the farmers cultivate pulses in third season during summer. Sugarcane is cultivated by 8 per cent farmers, banana by 6 per cent farmers, and other crops are cultivated by 4 per cent of farmers.

Table 3: Average Production of Paddy in Kurvai Season

S. No	Farms	Marginal	Small	Medium	Large	All
1	No. of producers	16	26	16	16	74
2	Cultivated (acres)	1.60	3.06	4.71	8.75	4.36
3	Per acres yield (Qtls.)	36.00	35.20	35.75	38.56	36.26
4	Total production (Qtls.)	58.06	107.88	169.81	338.31	161.04
5	Value (Rs.)	52886	96823	152768	289444	138823

Table 4: Average Production of Paddy in Thaladi/Samba Season

S. No	Farms	Marginal	Small	Medium	Large	All
1	No. of producers	137	104	51	31	323
2	Cultivated (acres)	1.75	3.48	6.59	11.69	3.94
3	Per acres yield (Qtls.)	31.29	31.74	34.07	34	31.92
4	Total production (Qtls.)	47.88	108.56	224.45	387.25	127.63
5	Value (Rs.)	39930	90643	176243	401020	112437

Table 5: Average Production of Paddy in Kodai Season

S. No	Farms	Marginal	Small	Medium	Large	All
1	No. of producers	12	9	8	8	37
2	Cultivated (acres)	1.40	3.20	5.87	12.75	5.29
3	Per acres yield (Qtls.)	33.75	36.66	38.8	36.25	36.37
4	Total production (Qtls.)	47.00	118.88	227.25	468.75	195.62
5	Value (Rs.)	44171	92519	218687	460700	183725

Production of Crops

As reported above 23 per cent of the farmers alone go for kuruvai paddy cultivation. Absence of canal water supply and difficulties in using ground water are limiting factors of the kurvai paddy cultivations. Average size of area brought under paddy crop in this season ranges between 1.60 acres for marginal group to 8.75 acres for large group. The proportion of area brought under paddy cultivation to the net cropped area is negatively associated with farm size. There is no much variation in yield of kurvai paddy among the different farm groups.

In the case of thaladi/samba seaons, all 323 farmers cultivate paddy. Average area brought under paddy crop during this season by marginal, small, medium and large farmers are 1.55, 3.48, 6.59 and 11.69 acres, respectively. Proportion of net cultivable area brought under paddy cultivation is almost 100 for marginal and medium farmers and more than 80 per cent of remaining two higher farm groups. Yield of the crops ranges between 31 qtls. for marginal farmers and 34 qtls. for large farmers.

Kodai paddy is cultivated by only 11 per cent of the farmers. Area under cultivation in this season is 1.40, 3.20, 5.87 and 12.57 acres for marginal, small, medium and large farmers, respectively. Yield of the paddy crop moves somewhat positively with farm size. At the same time, the proportion of the net cultivable area brought under this paddy cultivation moves negatively with farm size. Tables 3, 4 and5 give details on production of paddy in three different seasons.

Training Programmers for the Farmers

As reported in the previous chapter trainings programmers' are conducted to the farmers to prepare bio-fertilizer. Organized trainings are given by non-governmental organizations and State Agriculture Department. Sometimes is training also given by fellow farmers, neighbours, friends and relatives in informal ways]. More than 53 per cent of the farmers got training from any one of the sources. In which, 40 per cent of the famers get training organized by State Agriculture department. Remaining farmers got training NGOs and neighbours. Most of the farmers got training on preparation of composting, *panchagavya*, and vermi-compost.

Trends in Practicing Sustainable Farm Practices

Farmers are asked to report the trends in using sustainable farm practices among the farmers. Only six per cent of the farmers reported that the trend is increasing one; 36 per cent reported that no change in the trend; and remaining farmers (58 per cent) reported that there is a decreasing trend. Main reasons spelt by them for decreasing trend in the sustainable practices are poor yield of crops (24 per cent), constraints in getting organic inputs (24 per cent), time consuming process (9 per cent), and lack of manpower to implement practices (5 per cent).

Level of Awareness of the Farmers on Sustainable Agriculture

Awareness plays a crucial role in determining the attitudes of the people. It is important to analyse the level of awareness of the farmers on various sustainable farm practices. The research has employed a five point scale, as 'very good', 'good', 'average', 'poor' and 'very poor' for rating the awareness of farmers. Questions are raised on each aspect of sustainable farm practices. On the basis of the response, each respondent is rated according that. The level of awareness are summarised by farm group wise and reported in Tables.

Questions raised on practices related to crop rotation, crop holidays, summer plough, application of the fertilizer on the basis of soil test, reduce the use of chemical fertilizer, use of bio-fertilizer, natural ways of pest and weed control, maintaining favourable eco-system, environmental pollution due to chemical inputs, impact of chemical inputs on human and animal health, advantages of traditional crop varieties, uses of traditional knowledge of cultivation, implementing sustainable cultivation methods (like organic farming, SRI, IPM methods), marketing of organic products and future of sustainable agriculture.

Regarding marginal farmers, only 17 per cent of them scored as 'very good' or 'good' and 68 per cent scored 'poor' or 'very poor'. In the case of small farmers 27 per cent scored above average and only 39 per cent lies

below the average score. In the case of medium farmers, 41 per cent scored above average and 35 per cent scored less than average. For large farmers, 52 per cent scored above average and 24 per cent scored less than average. If we take all farmers together, 27 per cent lies above the average and 55 per cent lies below the average. The analysis shows that there is a positive relationship between farm size and level of awareness on sustainable farm practices.

Table 6: Level of Awareness on Sustainable Agriculture by All

Practices	Very Good	Good	Average	Poor	Very Poor
Crop rotation	16	14	26	53	214
Leaving the land as fallow	62	62	107	47	45
Summer plough	59	65	98	44	57
Application fertilizer on the basis of Soil test	53	57	76	61	76
Reduces the use of chemical fertilizer	48	55	74	56	90
Use of bio fertilizer	49	45	74	65	90
Natural way of pest and weed control	54	56	77	56	80
Maintaining favorable eco-system (providing t-joints at field, not disturbing snakes, birds and other natural enemies, etc.)	52	54	54	68	95
Environment Pollution by use chemical inputs	47	50	53	75	98
Impact of chemical inputs on human and animal health	24	19	21	57	200
Advantages of cultivation of Traditional rice varieties	32	35	43	56	157
Use of Traditional knowledge of cultivation	48	41	46	54	132
Practicing of various schemes for reducing chemical inputs (eg.IMP, SRI etc.)	39	37	39	56	150
Marketing of organic products	44	46	51	58	121
Future of sustainable agriculture	43	48	49	54	136
Total counts	670	684	888	806	1921
Percent age	13	14	18	16	39

Factors Influencing Rate of Adoption of Sustainable Farm Practices

In order to analyze the factors determining the rate of adoption of sustainable farm practices (in terms of proportion of organic inputs used to the total inputs used) linear regression analysis is used. The results of the analysis are given in Table 7.

Table 7: Regression Results

Dependent variable: Adoption Rate of Organic input (in percentage)

Independent variables	Coefficient	t-Value	Significance level
(constant)	14.485	2.733	1%
Education (year of schooling)	0.024	0.113	Not.sig
Farm Income (RS.)	-4.395E-6	-1.909	10%
Farm size (in acres)	1.405	4.448	1%
No. of Paddy crop cultivated in year	0.978	0.418	Not. Sig
Yield (in bags)	-0.176	1.927	10%
No.of Cattle	0.362	1.824	10%
Pulses Cultivation Dummy	-0.596	0.139	Not -sig
Irrigation dummy	-2.789	1.074	Not-sig
Preparation of Bio-Fertilizer Dummy	7.964	3.525	1%
Perception Level (scores 1 to 5)	1.646	1.675	10%
Adjusted R^2	0.344	-	Not –sig
F	6.586	-	1%
N	323	-	-

The results show that variables like education, number of paddy crop cultivated in a year, yield, number of cattle in the farm, pulses cultivation, irrigation, bio-fertilizer preparation and perception give expected signs. In which, farm size, yield, number of cattle, preparation of bio-fertilizer in the farm and perception of the farmers are statistically significant. The model has 34 per cent of explanatory power (adjusted R2). The F-value is significant at 1 per cent level, which indicates that all the coefficients of the model are significant simultaneously.

Testing ANOVA

Table 8 gives some basic idea about the rate of adoption of organic inputs by the farmers and corresponding level of yield. The table shows that adoption rate increases along-with farm size. Simultaneously, the yield of paddy also moves positively with farm size to some extent, if all three seasons are taken together.

Table 8: Rate of Adoption of Organic Inputs and Mean Yield of Paddy (Bags/acre)

Farm Group	Average Rate of Adoption (percentage)	Yield of Paddy			
		Kurvai	Thaladi/Samba	Kodai	All Season
Marginal	21.61	35.59	31.93	35.10	31.00
Small	21.73	35.12	32.02	36.50	33.00
Medium	26.58	35.92	33.56	39.43	35.00
Large	35.95	32.45	33.39	36.25	35.00
All	23.81	35.89	31.95	36.54	33.00

Note: one bag =70 kgs.

The result states that “there is a negative relationship between farm size and adoption rate of organic inputs.” It is tested with the help of Pearson’s correlation coefficient. Observed correlation coefficient between the two variables is r = 0.26, which is significant at 1 per cent level. It indicates that there is a positive relationship between farm size and rate of adoption of organic inputs.

Suggestion and Conclusion

Suggestions

Following are some of the suggestions to enhance the use of organic inputs among farmers and to intensify sustainable farm practices:

- Directing NGOs towards Sustainable Agriculture: From the study it is understood that only three non-governmental organizations are effectively functioning in promoting organic farming and other sustainable farm practices. At present there are 2,92,317 farm households living in 906 revenue villages in Thanjavur district. Existing NGOs cover only limited farmers belonging to very few numbers of villages. So, efforts should be taken to divert other NGOs for the benefits of farmers of Thanjavur district, which is practising intensive paddy cultivation.
- Integration: Governments at Centre and State should come forward to expand the activities of existing NGOs by providing more technical, personnel, material and financial supports. State Agriculture Department should extent full support to the existing NGOs for implementing their programmes through them.
- Community Composting Centers: Collection and composting of municipal wastes becomes a serious problem for municipal authorities. Setting up of scientific 'community composting centers' with the active participation of municipal authorities, NGOs and farmers in urban, semi-urban and rural areas will be the better solution for the problems of municipal authorities, people and farmers.
- Village Training Centers in All Villages: A permanent village center should be formed for all type of training and agricultural extension activities. It should be similar to the Village Resource Center formed by M. S. Swaminathan Research Foundation in the study area. Periodical training should be offered to the farmers in creation of awareness, production, utilization, and marketing of organic inputs.
- Non-chemical Pest Control Methods: Continuous efforts should be taken towards popularizing and implementing non-chemical pest control methods like organic, cultural, natural and mechanical. Both governmental and non-government organisations can give financial and technical support in these lines.

Conclusion

India is a vast country in terms of geographical area, size of population and volume of natural resources. Indian farmers have additional responsibility to provide healthy and safe food, not only for domestic people, but for people of other countries also. Because, the country has gained first place in production, consumption and export of many agricultural produce. It has competitive advantage in production and marketing of many of such produce over other countries. The country is a net agricultural exporter. It is the duty of Indian farmers to save the quality of vast natural resources available in the country in order to save the future generation. They should avoid or minimize the negative production externalities. To fulfill these things, concrete efforts are needed to establish sustainable farm practices. This can be realized only through integrated approach of farmers, public, government and non-governmental organizations.

References

1. E. A. Stockdale, N. H. Lampkin, M. Hovi et al., "Agronomic and environmental implications of organic farming systems," Advances in Agronomy, vol. 70, pp. 261–327, 2001.
2. K. Surekha, "Nitrogen-release pattern from organic sources of different C : N ratios and lignin content, and their contribution to irrigated rice (Oryza sativa)," Indian Journal of Agronomy, vol. 52, no. 3, pp. 220–224, 2007.
3. K. Y. Chan, C. Dorahy, T. Wells et al., "Use of garden organic compost in vegetable production under contrasting soil P status," Australian Journal of Agricultural Research, vol. 59, no. 4, pp. 374–382, 2008.
4. M. Tamaki, T. Itani, and H. Nakano, "Effects of organic and inorganic fertilizers on the growth of rice plants of rice plants under different light intensities," Japanese Journal of Crop Science, vol. 71, no. 4, pp. 439–445, 2002.
5. K. Laxminarayana and Patiram, "Effect of integrated use of inorganic, biological and organic manures on rice productivity and soil fertility in ultisols of Mizoram," Journal of Indian Society of Soil Science, vol. 54, no. 2, pp. 213–220, 2006.
6. T. S. S. Rao and C. R. Sankar, "Effect of organic manures on growth and yield of brinjal," South Indian , vol. 49, pp. 288–291, 2001.
7. Dr. p. Bhattacharyya and Dr.Krishna Bihari, "Scope of Organic Farming in India"organic Farming and sustainable agriculture, pp.34-39,Authour H.M.Gupta, published 2005,

8. Stefano Bocchi and Antonino Malgioglio, "Azolla-Anabaena as a Bio fertilizer for Rice Paddy Fields in the Po Valley, a Temperate Rice Area in Northern Italy" Hindawi publishing Croporation International Journal of Agronomy, Volume 2010, Article ID 152158, 5 pages,doi:10.1155/2010/152158.
9. S.Sheraz Mahdi,G.I Hassan et al "Bio-Fertilizer in organic agriculture", Journal of phytology,ISSN: 2075-6240, pp 42-45 www.journal-phytology.com.
10. Rajendra Prased "Sustainable agriculture and fertilizer use"www.iisc.ernet.in, pp 1-9, 1999.
11. D.S. Thakur and K.D.Sharma, "Organic Farming for Sustainable Agriculture and Meeting the Challenges of Food Security in 21st Century: An Economic Analysis", Indian journal of agriculture Economic, vol,60, No,2,April-June 2005,pp205-219.
12. Shalendra and S.K.Tewari, "Crop Production Planning for sustainable agriculture in western Uttar Pradesh through Lexicographic Goal Programming", Indian journal of agriculture Economic, vol,60, No,4, oct-Dec 2005,Pp615-628.
13. R.Rajendran and R.kasthuri, "Extent of Sustainable Farm Practices in Paddy Cultivation of Cauvery Delta in Tamil nadu," International Journal of Current Research, vol.5,pp 3221-3227,2013.