ECO FRIENDLY APPROACHES FOR SUSTAINABLE AGRICULTURE

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ABSTRACT

Green revolution technologies have more than doubled the yield potential of rice and wheat, especially in Asia. These high input production systems requiring massive qualities of fertilizers, pesticides. irrigation and machines, however, disregard the ecological integrity of land, forests and water resources, endanger the flora and fauna and cannot be sustained over generations. To a great extent, future food security and economic independence of developing countries would depend on improving the productivity of biophysical resources through the application of sustainable production methods, by improving tolerance of crops to adverse environmental conditions and by reducing crop and post-harvest losses caused by pest and diseases.Indigenous agricultural practices can play a key role in the design of sustainable and eco-friendly agricultural systems, increasing the likelihood that the rural population will accept, develop and maintain innovations and interventions. In this context, that eco-friendly methods are being considered as environmentally safe, selective, biodegradable, economical and renewable alternative for use in organic farming system. Organic farming implies, that the use of organic nutrients and adoption of natural methods of plant protection in place of fertilizers and pesticides. To the maximum extent feasible organic farming system rely upon crop rotations, crop residues, animal manures, legumes, green manures, mineral baring rocks and aspects of biological pest control to maintain soil productivity and tilth to supply plant nutrients and to control insects, weed and other pests. Hence, realizing the importance of sustainable agriculture of farming systems that are environmentally sound, profitable production and maintain the social fabric of the rural community, this study was undertaken to establish and enhance rural environment and agricultural practices.

Key Words : Agriculture, Organic farming, Sustainable, Green revolution, Green manure

INTRODUCTION

Eco friendly approaches for sustainable agriculture

Agriculture is the most important enterprise in the world. Agriculture is the process of producing food, feed, fiber and other desired products by the cultivation of plants and the raising of domesticated animals. In a true sense, it is a productive unit where human get the free gifts of nature namely, land, light, air, temperature, rain water, humidity etc. are integrated into a single primary unit indispensable for human beings.[1]

The effect of prolonged and over usage of chemicals in crops production has resulted in human health hazards and pollution of environment and ground water. At present, the issue is whether to continue with the chemical inputs-based intensive technologies or to go back to the traditional environment friendly farming practices like organic farming for sustainable production, income and socio-economic development of the farming community.[2]

In this context that biological pesticides are being considered as environmentally safe, selective, biodegradable, economical and renewable alternative for use in organic farming system.[3]

Green Pesticides or ecological pesticides which are believe to be environmentally friendly and thus cause less harm to the eco system and animal health. In agrology, pesticides are evaluated for

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minimal average environmental effects. Biocides include germicidal, antibiotic, antibacterial, antiviral, antifungal, antitrotozaols and antiparasites. Pesticides typically came in the form of sprays and dusts. many ecological pesticides are biological pesticides.[4]

Environmental friendly agricultural technologies for food safety appropriate technologies, which do not assault the nature, would have key roles to play in ensuring food security, in improving human health and in rehabilitating and conserving the environment to safeguard the well being of the posterity. Instead of striving for more "green revolutions" with emphasis on miracle seeds, hard-hitting, synthetic and engineered pesticides and increased use of fertilizers, the future must look to natural ways and processes for augmenting agricultural productivity. In fact, all development efforts and activities should be within well defined ecological rules rather than within narrow economic gains. Sustainable agricultural systems must be ecologically sound for long-term food sufficiency, equitable in providing social justice, and ethical in respecting path future generations and other species.[5,6]

Hence, realizing the importance of sustainable agriculture of farming systems that are environmentally sound, profitable, production and maintain the social fabric of the rural community, this research was undertaken with the following objectives.

AIMS AND OBJECTIVES

Find out the existing agricultural practices – crops cultivation, production, storage and problems faced.

Conduct training programme on eco-friendly methods of pest and disease management for sustainable agriculture.

Evaluate the impact of the training programme on eco-friendly methods of pest and disease management.

METHODOLOGY

To conduct the research, Thondamuthur block of Coimbatore district, India was selected. Of the 21 villages, 10 villages were selected based on production and storage of food grains. For the household survey, 150 farm households were randomly selected representing 50 marginal farmers, 50 small farmers and 50 large farmers.

A household survey was conducted through interview method using a pre structured schedule to identify the different kinds of harvesting and storage practices followed and the problems encountered during pre-harvesting and post harvesting period. Based on the data collected, the training curriculum was formulated to impart knowledge on eco-friendly agricultural practices. Training was given to the selected homemakers who were willing to participate and deliver the messages learnt to other members – both men and women.

Training was given for a period of five days, two days for theoretical explanation and three days for field demonstration. Training programme included lectures, participatory discussions, demonstrations, meetings, exhibitions and field visits. The visual aids used were chart, posters and pamphlets and film shows.

The impact of the training programme was evaluated with the help of an evaluation schedule which was administered before and after the training programme. Salient features of the research are presented below.

RESULTS AND DISCUSSION

Total number of farmers benefited with the training programme

Show the total number of farmers benefited by the training programme (**Table 1** and **Fig. 1**).

Three frontline women workers in each village (representing one marginal, one small and one large farmers). Totally 30 front line women workers were given training for a period of five days at the block and village level. They were trained and demonstrated on organic methods of pest and disease management for sustainable agriculture.

With the help of the trained front line women workers, five days training programme was conducted for the farm population in each of the selected villages. **Table 1** shows the total number of farmers benefited by the training programme. **Table 1** implies that women's participation was found to be higher 814 women when compared to men and youth. It reflects the fact that the women were more interested in learning and adopting new concepts and techniques.

The programme was conducted in simple regional language and easily understand. The programme

Table 1 : Total number of farmers benefited with the training programme

S/N	Name of villages	Number of participants			
		Women	Men	Youth	Total
1.	Devarayapuram	70	15	10	95
2	Kaliyannanpudur	92	30	18	140
3	Kuppandampalayam	79	19	20	118
4	Parameshvarampalayam	65	20	9	94
5.	Pulahgoundampudhur	89	15	17	121
6	Narasipuram	85	32	15	132
7	Selampanur	71	17	20	108
8	Valayapalayam	82	20	12	114
9.	Vellimalai Pattinum	91	30	20	141
10.	Viraliyur	90	12	17	119
	Total	**814**	**210**	**158**	**1182**

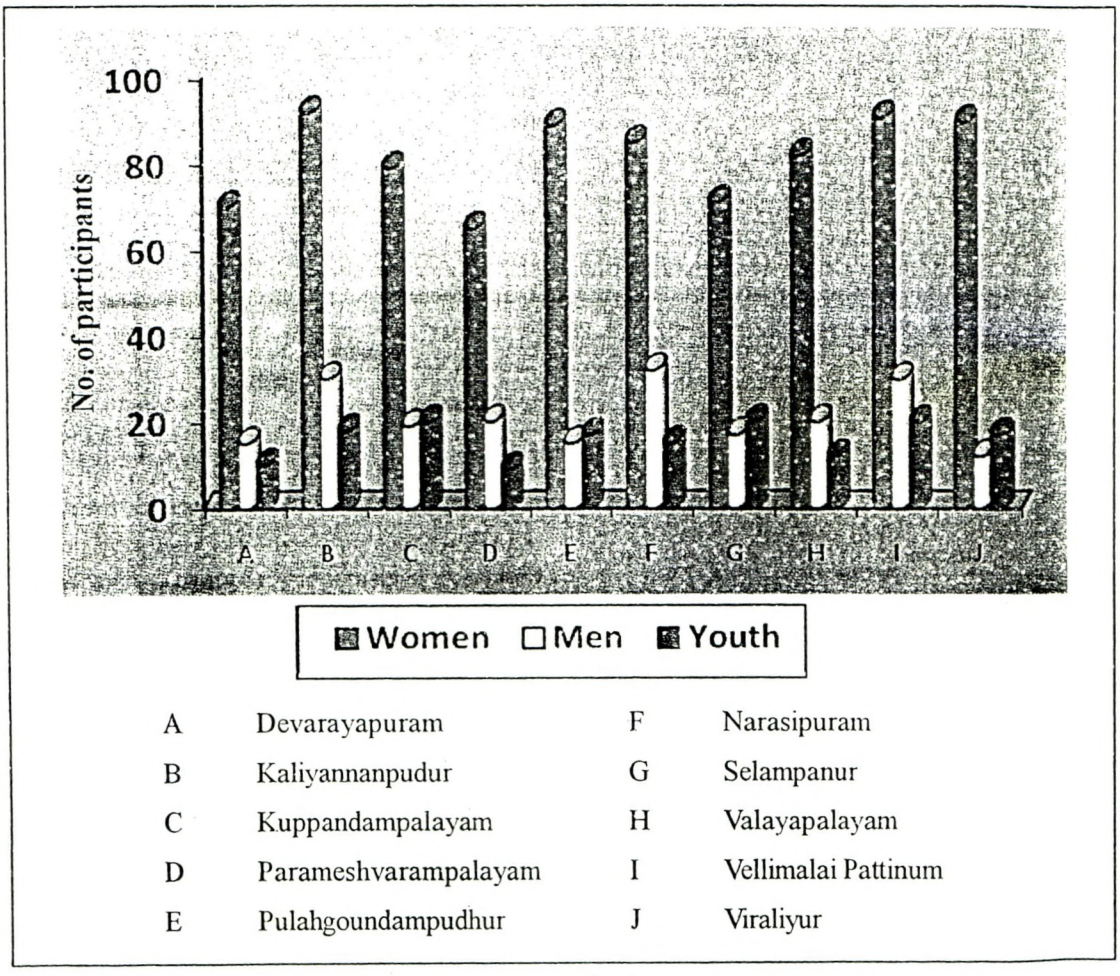

Fig 1 : Total number of farmers benefited with the training programme

Table 2 : Percentage of knowledge gained by the selected homemakers

S/N	Aspects	Before training	After training
1	Operation involved in pre-harvest	40	90
2	Operations involved in post harvest	70	100
3	Causes of food grain spoilage	40	100
4	Insect infestation in food grain	70	100
5	Safeguarding grains from moisture and fungus	30	80
6	Insecticides and fumigants	10	70
7	Nature of damage by rodents	90	100
8	Methods of controlling rodents	40	100
9	Poison used for rodent control	20	80
10	Precautions in using		
	a. Insecticides	10	70
	b. Fumigants	10	70
	c. Problems due to synthetic insecticides and fumigant	10	60
11	Eco-friendly (organic) methods of pest and disease management		
	a. Pre-harvest	40	100
	b. Post harvest	20	100
	c. Advantages of eco-friendly methods	20	100

was fruitful and effective with lot of participants with enthusiasm and interest.

Knowledge gained by the homemakers

Table 2 exhibits the percentage of knowledge gained by the selected homemakers through the training programme.

It is clear that there was a significant gain in knowledge among the recipients of the training on eco-friendly method of pest and disease management.

The significant result obtained might be attributed to the responsibility exhibited by the homemakers who playing the leadership role assigned to them. As a follow up of the training programme, they showed great interest in learning new methods on pest and disease management.

Attitudes developed by the homemakers

In order to find the right reflection of the homemakers attitude towards organic methods of pest and disease management, an attitude scale was developed based on Likert's Summated Rating Scale Technique. Each item in the scale was provided with five response categories. They were strongly favourable, favourable, neutral, unfavourable, strongly unfavourbale with scores 5, 4, 3, 2 and 1. Based on the responses obtained against each items, total attitude scores was obtained and shown in **Table 3**. The 't' test was calculated for the attitude scores and the results are depicted below.

It is evident from the above table that the training programme changes the attitudes of homemakers on organic methods of pest and disease management. The attitude score has increased from a minimum score of 1 to a maximum score of 90 after attending the training programme. The small farmers realized the fact that traditional storage practices demands excessive time for the purpose of storing of the grains. The large farmers

Table 3 : Attitude scores obtained by the homemakers

S/N	Marginal		Small		Large	
	Before training	After training	Before training	After training	Before training	After training
1	28	76	22	84	28	85
2	29	81	27	82	28	84
3	18	69	21	81	22	86
4	62	80	38	81	30	88
5	4	81	46	82	48	90
6	51	88	65	90	58	83
7	5	80	52	82	59	83
8	58	82	56	80	52	84
9	46	68	58	84	69	83
10	46	72	38	73	40	85
11	51	90	52	90	51	90
12	51	89	49	80	48	89
13	25	89	27	87	28	88
14	30	66	28	49	36	76
15	32	66	35	72	38	75
16	1	73	58	73	50	75
17	32	84	38	89	36	90
18	21	65	28	74	22	89
't' values	12.19*	38.22*	12.55*	35.58*	12.75*	72.37*

* - Significant at one per cent level

attitude has changed with respect to organic storage practices which needed excessive labour for periodical cleaning of food grains.

The attitude scores of the farmers of all category was increased and also had shown significant 't' values which implies the fact that the attitudes of the homemakers on agricultural practices has been changed after attending the training programme.

Extent of adoption of organic agricultural practices

After providing training on organic agricultural practices, the farmers were encouraged to adopt the organic agricultural practices effectively. Periodically the farmers were guided. The adoption level of organic agricultural practices is given in **Table 4**. The chi square values were obtained for the adoption level and are shown below.

It is evident from the **Table 4** that after the training programme, the adoption level of the selected households had increased. It was found that cent per cent of the farmers of all category dried food grains before storage; Cent per cent of large and 98 per cent each of large, small and marginal farmers respectively enthusiastically followed the eco-friendly storage practices. More than 90 per cent of the farmers of all categories used neem treated dunnage, wonder trap, disinfected neem leaf extract gunny bags and polythene bags. It was observed that only a lesser proportion of the farmers used metal bins, viz, marginal farmers (3 per cent), small (5 per cent) and large farmers (7 per cent) due to higher cost of metal bins, the marginal and small farmers were not able to afford it when compared to large farmers.

The Chi square test implied that the adoption level of the large farmers were significant when compared to small and marginal farmers. Impact of the training programme was so effective that majority of them have adopted and followed organic agricultural practices after the training programme.

Losses of food grains during storage before and after adoption of organic methods

Losses of food grains during storage before and after adoption of organic agricultural practice is presented in **Table 5**

Losses of food grain during the storage period about 5-10 per cent and 5-8 per cent for marginal

Table 4 : Adoption of organic agricultural practices

S/N	Organic agricultural practices	Percentage of households*		
		Marginal farmers	Small farmers	Large farmers
1	Pre storage treatments, cleaning and drying of grains	100	100	100
2	Preparation of storage rooms and structure·			
	a. Cleaning of storage room with neem extract.	98		
	b. Use of Neam leaf extract treated dunnage	96	99100	99100
3	Biological control of pests and insects	98	98	100
4	Rat control measures chemical and mechanical control.			
	a. Wonder trap	90	99	99
5	Use of improved storage structure·			
	a. Use of disinfected gunny bags (neem treatment)	90		
	b. Use of polythene bags	91		
	c. Use of metal bin	3	94955	97947
	Chi square value	**1.200**	**4.400**	**2.600****

* Multiple responses

** Significant at five per cent level

Table 5 : Losses of food grains during storage before and after adoption of organic methods

S/N	Particulars	Percentage of households					
		Marginal (N=50)		Small (N=50)		Large (N=50)	
		Before	After	Before	After	Before	After
1	Moisture	5-10	2-6	5-8	2-4	5-5	1-2
2	Fungi	5-15	2-4	5-10	2-3	5-8	2-1
3	Mould	5-10	2-6	5-8	2-4	5-5	1-3
4	Insects	5-8	1-3	5-5	1-2	5-3	1-2

and small farmers respectively due to the cause of moisture and mould, while 5-15 per cent and 5-10 per cent for marginal and small farmers respectively by fungi and 5-8 per cent and 5-5 per cent for marginal and small farmers respectively by insects.

After applying the organic methods the losses of food grains due to moisture and mould during the storage period is reduced at about 2-6 per cent and 2-4 per cent for marginal and small farmers respectively. While for the 2-4 per cent and 2-3 per cent for marginal and small farmers respectively by fungi and 1-3 per cent and 1-2 per cent of marginal and small farmers respectively by insects. As a result of adoption of organic method for pest management in stored food grains, on an average a saving of 15 kg of food grains worth Rs.600 for marginal farmers, 18kg worth of Rs. 720 for small farmers and 25 kg worth Rs.1000 for large farmers per household per cropping had accured. The reduction of food grain losses could be attributed mainly by adoption of organic methods followed by the farmers, such as proper drying of food grain use of neem treated dunnage, use of neem powder to control pests in stored food grain. If farmers continue to adopt such practices quite a significant amount of food grains could be saved.

Opinion regarding the adoption of organic methods

The opinion regarding the adoption of organic methods to control pest was assessed and presented in **Fig. 2** and **Table 6.**

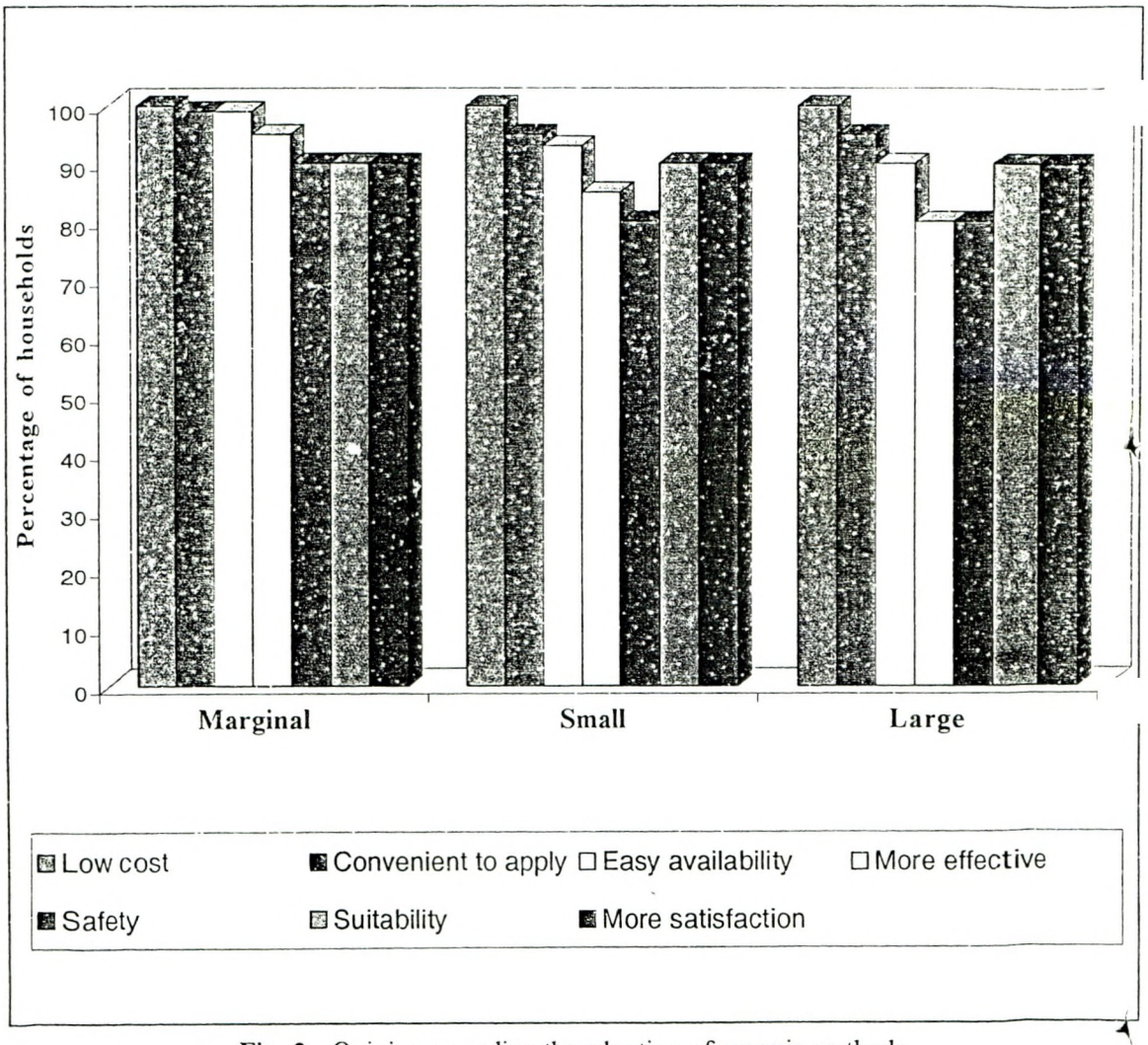

Fig. 2 : Opinion regarding the adoption of organic methods

Table 6 : Opinion regarding the adoption of organic methods

S/N	Opinion	Percentage of households*		
		Marginal (N=50)	Small (N=50)	Large (N=50)
1	Low cost	100	100	100
2	Convenient to apply	99	95	95
3	Easy availability	99	93	90
4	More effective	95	85	80
5	Safety	90	80	80
6	Suitability	90	90	90
7	More satisfaction	90	90	90

* Multiple responses

Cent per cent of marginal, small and large farmers respectively opined that it is low cost. Ninety-nine per cent and 95 per cent each of marginal, small and large farmers respectively expressed that it is convenient to apply. Ninety nine per cent of marginal and 93 per cent of small and 90 per cent of large farmers emphasized that it is easily available to use. Ninety five per cent of marginal, 85 per cent of small and 80 per cent of large farmers stressed its effectiveness.

CONCLUSION

The training programme in the selected village has made a significant impact on pre and post harvest agricultural practices of the food grains. The farm population was highly satisfied with the conduct of the training programme and they showed greater interest in learning and adopting new concepts related to organic agricultural practices. Thus, the village wide programme launched to educate, motivate and persuade the farmers to adopt organic agricultural practices was successful with majority understanding and following the techniques which resulted in saving of food grains and money. The training helped the farmers to control the avoidable pre- and post harvesting losses and to save each and every grain produced. It would ultimately lead the nation to attain prosperity and food security.

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Living simply has resulted in us becoming more aware of the environment and the impact we have on it.

Catherine Pulsifer