Asian Journal of Agricultural Extension, Economics & Sociology

39(7): 96-103, 2021; Article no.AJAEES.67098
ISSN: 2320-7027

Effectiveness of Farmer Field School and Conventional Extension Trainings on Knowledge Gain among Farm Women

J. Krishnan[1*], T. T. Ranganathan[2] , P. Ravichamy[3] and K. C. Sivabalan[4]

[1]Gandhigram Rural University, Gandhigram, Dindigul District, Tamil Nadu, India.
[2]Faculty of Agriculture and Animal Husbandry, Gandhigram Rural University, Gandhigram, Dindigul District, Tamil Nadu, India.
[3]ICAR - National Research Centre for Banana, Tiruchirapalli, Tamil Nadu, India.
[4] Agricultural Consultant, Trichy, Tamil Nadu, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author JK designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. He also managed the analyses of the study managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2021/v39i730613
Editor(s):
(1) Dr. Ian McFarlane, University of Reading, UK.
Reviewers:
(1) Faruque-As-Sunny, Zhejiang University, China.
(2) Jorge Luiz da Silva, Federal Institute of Education, Brazil.
(3) Tamara Jackson, Charles Sturt University, Australia.
Complete Peer review History: https://www.sdiarticle4.com/review-history/67098

Original Research Article

Received 20 February 2021
Accepted 24 April 2021
Published 15 July 2021

ABSTRACT

The world extension forum over three-four decades emphasized the people centric bottom up approach in extension work.
In mid 1970s world bank had introduced Training and Visit (T&V) system of extension in 70 countries including India. This solely emphasized the dissemination of Green Revolution technologies to farmers, mainly in Asian and African countries with top down extension approach. Subsequently, FFS emerged in the rice paddy fields of the Philippines and Indonesia in the late 1980s where, Food and Agriculture Organization (FAO) had heavily involved from its incubation, development and spread to Asian, African countries and other parts of world in 1990s with the emphasis on bottom up approach and participatory extension services. This demanded a paradigm

**Corresponding author: E-mail: krish72oxigen@gmail.com;*

shift in extension purview and its methodology to factor upon farming fraternity participation in all possible ways. Despite that the technology transfer process remains unchanged and unrefined till now. The best features of extension methodologies are identified by making literature review pertaining to Farmer Field School (FFS) and Training and Visit (T&V) method of extension trainings. Both Farmer Field School (FFS) and conventional extension training methodologies were used to train women groundnut growers in Pennagaram villages, Dharmapuri, India and the change in knowledge level and the effectiveness of methodologies were studied. In context, 29 important crop production practices in groundnut cultivation were identified and surveyed with 300 participants of which, 50% of participants (n=150) exposed to FFS way of training and 50% of participants (n=150) exposed to T&V way of training. Most (90-95%) of the survey respondents found that the FFS way of training as better effective than T&V way of training. Similarly, the knowledge level of 80 to 85% of participants who participated FFS way of training found to be more than the participants who attended T&V way of training.

Keywords: Farmer Field School (FFS); Training and Visit (T&V); Food and Agriculture Organization (FAO).

1. INTRODUCTION

Extension services worldwide play a major role in technology transfer to the farming community in addressing array of problems in crop production and allied farm sectors. The farming problems are interconnected in nature, hence the extension approach need to be multifaceted with broad based approach to address them. The Farmer Field School (FFS) way of extension is widely admired and practiced as this emphasize upon people-centered learning, participatory learning environment, and participants can exchange their knowledge and experience by doing on-field studies. Beginning in the mid-1970s the World Bank introduced the Training and Visit (T&V) extension system into about 70 countries including India. the investment's stimulus was to speed up the dissemination of Green Revolution technologies to farmers, mainly in Asian and African countries [1] Benor and Harrison 1977). Of late in ensuing years, there has been paradigm shift in Technology Transfer extension approach i.e., Training &Visit (T&V) to more facilitative and participatory approaches as we could see in FFS method of extension. The Farmer Field School (FFS) approach has been tried widely and has positively impacted on crop and soil productivity in many Asian and African countries [2]. Addressing array of farm related problems can only be possible when the farmer participation is ensured by putting them in an experiential learning environment with long association instead of feeding them everything readily.

Originally, FFS programmes were related mainly to IPM, but soon have been adapted to other technical domains [3]. FFS plays an important part in social inclusion and gender mainstreaming. It contributes participation and empowerment of livelihoods of vulnerable groups especially rural women [4]. The objective of this paper is to discuss the effectiveness of extension methodologies followed in FFS comparing with conventional (T&V) way of extension methodologies. The farm women who underwent the season long FFS training and T&V way of trainings were surveyed and the result forms the basis for this paper.

2. METHODOLOGY

Two groups of women groundnut producers in different villages were selected during the crop production season. "The best principles of extension methodologies were identified by making literature review rigorously pertaining to FFS and T&V method of trainings and thus a set of 9 successful principles compiled and used in interview schedule. Both the participants' knowledge level was assessed through twenty nine crop production practices. The score gained under each category of statements of FFS and T&V were analyzed using Mean Score and Z-test.

The survey was implemented through farm and home visit, directly interviewed the participants (of various (10) villages) women groundnut growers who underwent the FFS and T&V training separately. A sample of 150 women groundnut farmers who underwent FFS way of training (5 villages) for the entire groundnut season and 150 women groundnut farmers who underwent T&V way of training (5 villages) were chosen for this study adopting proportionate random sampling technique. Respondents were

interviewed with the list of 8 extension methodologies and asked for their response whether the trainer used the methodology. Their response was collected on 5 points continuum such as strongly disagree, disagree, neutral, agree and strongly agree on the training methodology used by both FFS and T&V way of training. And in case of response on knowledge gain was collected on 3 points continuum such as Yes, no and don't know. The response data were analyzed using the mean score and Z-test statistic with significance level set at 5 and 1 per cent level.

3. RESULTS AND DISCUSSIONS

The technology transfer process without regard to farmer's participation, involving them in bottom up planning, involving them on-field experiments found to be an ineffective [5]. It results in poor knowledge gain both by farmer and the trainer/researcher. Longer the association better would be the better results. FFS way of training provides season long association with farmers that provides robust learning on various stages of crop growth and face to face interaction frequently, whereas it is missing in conventional extension system [6].

The respondents from FFS way of training villages comprised of 50% (*n*=150) across 5 villages and respondents from T&V way of training villages comprised of 50% (n=150) across another 5 villages.

All the respondents were female with a mean age of 35-45 years (Table 1) both in case of FFS and T&V trained groups of farmers. Majority of respondents in FFS group had middle (39.3%) and secondary (33.4%) level of education and in case of respondents in T&V group had almost similar education level such as middle level of 36.7% and secondary level of 32.0% respondents. In both the cases college level

Table 1. Characteristics of respondents

Category	FFS farmers (n=150)	T&V farmers (n=150)
Mean age (yrs)	35-45	35-45
Education (%)		
illiterate	2.0	4.7
Functionally Illiterate	6.0	6.0
Primary	17.3	18.0
Middle	39.3	36.7
Secondary	33.4	32.0
Collegiate	2.0	2.6
Farming experience		
Low	19.3	18.0
Medium	61.4	63.3
High	19.3	18.7

Table 2. Effectiveness of FFS and T&V extension methodologies

Sl No.	Particulars	Means scores		Z-Test statistic	P Value
		FFS (n=150)	T&V (n=150)		
1	Adult learning principles.	6.91	3.40	45.44**	0.00
2	Equal partnership among extension, farmers and researcher	5.56	1.16	31.51**	0.00
3	Bottom up approach, farmer centric planning & implementation.	6.71	3.04	48.89**	0.00
4	Learning in field rather than in class room.	7.00	3.08	167.80**	0.00
5	Community mobilization for planning and action	4.83	3.10	43.33**	0.00
6	Strengthen farmers'	7.00	1.15	122.19**	0.00

Sl No.	Particulars	Means scores		Z-Test statistic	P Value
		FFS (n=150)	T&V (n=150)		
	problem solving and management ability.				
7	Encourage farmer to learn through experimentation and become expert	6.89	1.23	73.76**	0.00
8	Promote farmers capacity to adopt and develop new appropriate technologies	8.15	1.33	67.40**	0.00

*Significant at 5 per cent level ** Significant at 1 per cent level

education found to be almost equal that ranged 2.0% in FFS group and 2.6 in T&V group. In case of illiteracy in FFS group found to be lesser (2.0%) than the T&V group (4.7%). While in case of functionally illiterate found to be same (6%) in both the cases, the primary level of education also found to be nearer such as FFS group with 17.3% and T&V group with 18.0%. Similarly, in case of farming experience 61.4% of respondents in FFS group and 63.3% of respondents in T&V group had medium level of education. The low level of farming experience found to be 19.3% of respondents in FFS group and 18% in T&V group. While 19.3% of respondents had high level of farm experience in FFS group, it was 18.7% of respondents in T&V group.Due to enhanced technical skills, participants expressed community recognition and later stages, it leads to formal or informal organizations [7,8].

Groundnut cultivating women farmers who underwent FFS (150 farmers from 5 villages and the similar group of women who cultivated groundnut (150 farmers from 5 villages) with the support of conventional extension services was surveyed to assess the effectiveness of FFS and T&V way of extension methodology. In context, various statements were used and data collected from the respondents to assess the effectiveness of both. Data were analyzed by using large sample normal test. The result indicated that adult learning principles significantly differed from both the methods. The mean scores (Table 2) showed FFS (6.91) way of training as more than that of T&V (3.40) way of conventional extension training. The adoption and sustainable use of farm technologies is witnessed among FFS participants [9]. Similarly, the equal partnership among extension, farmers and researcher followed in FFS significantly differed from T&V system and the mean score showed FFS (5.56) system as more than that of T&V (1.16). In case of bottom up approach, farmer centric planning and implementation FFS way of training significantly differed from T&V way, where the mean score showed FFS (6.71) training as more than that of T&V (3.04). The statement learning in field rather than in class room gained more mean score in FFS (7.00) training than that of T&V (3.08) way of training where FFS significantly differed from T&V system. In case of community mobilization for planning and action, FFS significantly differed from T&V system and the mean score showed FFS (4.83) training as more than that of T&V (3.10) way of training. Similarly, the result indicated that strengthening of farmers' problem solving and management ability FFS significantly differed with T&V method of training. The mean scores showed FFS (7.00) way of training as more than that of T&V (1.15) way of conventional extension training. In case of encouraging farmer to learn through experimentation and become expert, FFS differed significantly with T&V and the mean scores showed FFS (6.89) way of training as more than that of T&V (1.23) way of conventional extension training. Similarly the result indicated that promoting farmer's capacity to adopt and develop new appropriate technologies FFS significantly differed with T&V way of training. The mean scores showed FFS (8.15) way of training as more than that of T&V (1.33) way of conventional extension training.

Twenty nine statements representing important crop production practices were identified (Table 3) for this purpose that considered being very important knowledge that farm women should have for successful groundnut crop cultivation.

Of the twenty nine statements relating to groundnut crop production, the statement Gypsum is applied at 40^{th} day during second weeding along with earthing up is equally understood well on its importance and had good knowledge by both FFS and T&V participants where the mean score of both the participants was 3.0 and the P-value was 1. Where as in case of statement Red hairy caterpillar pupates

in soil, the T&V participants showed lack of knowledge with mean score 0 when compare to FFS participants who got a mean score of 2.78. Similarly, the statement light traps can be used to attract the adults of leaf miner in groundnut; the T&V participants had no knowledge about it, whereas the FFS participants had good knowledge on it. Thus, the knowledge level of FFS participants significantly differed from T&V participants and the mean score of FFS participants was (2.86) more than that of T&V participants (0.05). For a statement Aphids presence in colonies over apical portion and suck the plant sap of groundnut; both FFS participants and T&V participants had equal knowledge level and understood well about pest behavior, where the FFS participants' mean score (2.74) and T&V participants' mean score (2.52) showed almost equal and not significantly differed. The knowledge level of T&V participants found to be lesser on the statement Soil mulching is important for weed control and to arrest moisture evaporation from soil; whereas in FFS participants it was found to be higher, due to the reason that the FFS participants were involved in field level mulching trials. Thus, the mean scores showed FFS (3.0) way of training imparted more knowledge to the participants than that of T&V (1.0) way of conventional extension training.

Table 3. Knowledge gained in groundnut cultivation through FFS method & T&V system of trainings

Sl no.	Crop production practices	Means Scores		Z-Test statistic	P Value
		FFS (n=150)	T&V (n=150)		
1	Application of FYM will increase water holding capacity of the soil	2.67	1.38	15.89	0.00
2	Fertilizer application will increase soil health	2.66	1.91	10.29	0.00
3	Trychoderma viride seed treatment will prevent root rot problem in groundnut	2.77	1.18	22.57	0.00
4	Pest attack can be controlled by seed treatment with fungicide.	2.86	1.16	27.13	0.00
5	Cow pea is cultivated as feast crop for sucking pests like aphids thereby avoiding its damage on groundnut.	2.89	1.67	22.42	0.00
6	Castor is grown as trap crop to trap caterpillar that attacks groundnut.	2.87	0.97	47.49	0.00
7	Rhyzobium seed treatment will increase root nodules in groundnut plants.	2.93	1.20	33.41	0.00
8	Spider is beneficial insects	2.84	1.21	24.33	0.00
9	Boarder crop with cumbu, sorghum will control sucking pest (like white fly) entry into the field.	2.85	1.0	43.6	0.00
10	Lady bird beetle is beneficial insects.	2.84	1.07	34.21	0.00
11	Rock phosphate can be used to prepare enriched FYM.	2.84	1.0	41.77	0.00
12	Groundnut Plant population per square meter is 33 plants.	2.53	1.0	22.75	0.00
13	Aphids presence in colonies over apical portion and suck the plant sap of groundnut.	2.74	2.52	2.45	0.013
14	Pheromone trap can perform without lure also.	2.90	1.0	54.88	0.00
15	Generally, after germination (at	2.78	1.0	32.22	0.00

Sl no.	Crop production practices	Means Scores		Z-Test statistic	P Value
		FFS (n=150)	T&V (n=150)		
	2-3 leaf) till 25-30 days the soil moisture should be moderate (irrigation should be avoided in case of irrigated groundnut) to facilitate shortening of inter node distance thereby better peg penetration into soil is ensured.				
16	N,P, & K are the macro nutrients required to plants.	2.6	1.0	24.47	0.00
17	Avoiding pesticide spray will protect predators or beneficial insects.	3.0	1.08	60.51	0.00
18	Yellow sticky traps will only attract non-sucking pests.	3	1.15	43.6	0.00
19	Seed hardening in groundnut is done to induce drought tolerance of seeds.	2.55	1.0	22.56	0.00
20	Pre germinated seeds are used in groundnut for better germination & population and as pre monsoon sowing.	2.7	1.0	28.57	0.00
21	Gypsum is applied at 40^{th} day during second weeding along with earthing up.	3	3.0	0.0	1.00
22	Phosphobacteria is added during Rockphosphate enrichment with FYM to solublize phosphorous of it and make available to plants.	2.73	1.0	31.26	0.00
23	Soil mulching is important for weed control and to arrest moisture evaporation from soil.	3	1.0	54.7	0.00
24	Red hairy caterpillar pupates in soil.	2.78	0	55.29	0.00
25	Light traps can be used to attract the adults of leaf miner in groundnut.	2.86	0.05	51.94	0.00
26	Weeds should not be allowed till 45 days in groundnut field.	2.52	1.0	21.77	0.00
27	Groundnut is effective erosion checking crop.	2.76	1.10	25.51	0.00
28	Spacing of groundnut should be 30x10 cm.	2.56	1.13	16.97	0.00
29	IPM is integration of more than 2-3 methods of pest control measure to control pests effectively.	2.77	1.0	34.29	0.00

Similarly, the knowledge level of T&V participants on five crop production practices such as Application of FYM will increase water holding capacity of the soil; Spacing of groundnut should be 30x10 cm; Groundnut Plant population per square meter is 33 plants; Groundnut is effective erosion checking crop; Weeds should not be allowed till 45 days in groundnut field; Generally, after germination (at 2-3 leaf) till 25-30 days the soil moisture should be moderate (irrigation should be avoided in case of irrigated groundnut) to facilitate shortening of inter node distance thereby better peg penetration into soil is ensured; found to be lesser than the FFS participants with significant difference. More

importantly, the FFS way of on-field training took care of imparting knowledge on very important critical crop stage such as shortening of internodes distance with moisture management as this facilitates more peg formation into soil whereas T&V way of training did not concentrate on these critical aspects. Hence, FFS participants had very high range of knowledge on these practices with mean score ranging from 2.52 to 2.67. Whereas the T&V participants had low level of knowledge with mean score ranging from 1.0 to 1.53.

Both T and V and FFS participants differed in their knowledge level on the soil health and nutrition related statements such as Fertilizer application will increase soil health; N,P, & K are the macro nutrients required to plants; Rock phosphate can be used to prepare enriched FYM; *Phosphobacteria* is added during *Rockphosphate* enrichment with FYM to *solublize phosphorous* of it and make available to plants; The mean score of FFS participants significantly differed with (ranged from 2.66 to 2.84) T&V participants (ranged from 1.0 to 1.91).

All the statements related to ecological management of crop pests such as Cow pea is cultivated as feast crop for sucking pests like aphids thereby avoiding its damage on groundnut; Spider is beneficial insects; Boarder crop with cumbu, sorghum will control sucking pest (like white fly) entry into the field; Lady bird beetle is beneficial insects; Pheromone trap can perform without lure also; Castor is grown as trap crop to trap caterpillar that attacks groundnut; the FFS participants had more knowledge than T&V participants where their knowledge level had significantly differed with (mean score ranged from 2.84 to 2.9) T&V participants (mean score ranged from 0.97 to 1.67).

Similarly, the knowledge level of T&V participants found to be lesser than the FFS participants on seed treatment related practices such as *Rhyzobium* seed treatment will increase root nodules in groundnut plants; Seed hardening in groundnut is done to induce drought tolerance of seeds; Pre germinated seeds are used in groundnut for better germination & population and as pre monsoon sowing; *Trychoderma viride* seed treatment prevents root rot problem in groundnut; Pest attack can be controlled by seed treatment with fungicide; FFS participants had significantly differed (mean score ranged from 2.55 to 2.93) with T&V participants (mean score ranged from 1.0 to 1.20).

In case of statement representing pest control related practices like IPM is integration of more than 2-3 methods of pest control measure to control pests effectively; FFS participants' knowledge significantly differed (mean score 2.77) with T&V participants (mean score 1.0).

Two important eco-friendly production practices such as *avoiding pesticide spray will protect predators or beneficial insects; Yellow sticky traps will only attract non-sucking pests;* were found to be with significant knowledge difference between FFS and T&V participants. FFS participants had high level knowledge with mean score of 3.0 whereas T&V participants had very low level knowledge with mean score ranged from 1.08 to 1.15. The reason might be that the FFS way of training had involved the participants in identification of predators and beneficial insects in the groundnut field and participants captured them and reared in poly bags and petri dish to study their behavioural interaction with pests. Similarly, they were also engaged to prepare yellow sticky traps and installed them in the groundnut field on their own, observed and counted the sucking pests stuck over the traps. This way of on-field participation and experiential learning environment provided them good opportunity to learn and acquire knowledge, whereas in T&V way of trainings these were deficient [10].

4. CONCLUSION

The farm Training would be delivered in a top-down manner, whereas FFS follows the participatory mode [11]. Farmer field schools improves farmers' knowledge and adoption of Good Agricultural Practices (GAP) [12]. Realizing the importance of FFS, FAO has developed over few thousands FFS in the Near East and North Africa (NENA) region primarily on good agricultural practices and IPM [13].The main objective has been to improve food security in the target areas of the participating countries and territories through community based – FFS – IPM, aiming at reducing and possibly eliminating pesticide related risks for health and environment, and at improving farmers' access to markets. TThe facilitator in FFS program generally treat the participants as equal partner and facilitate them in on- field experiments to bring out their skill and analytical capacity and participants learn on their own experientially. Whereas in T&V way of training, participants are treated as mere recipient and they have to follow

and accept what the trainer say. Therefore, the equal partnership among extension, farmers and researcher followed in FFS significantly impacts the livelihoods of rural society. Therefore, involving participants in on- field observation, experiencing the real field condition with frequent and long term trainer-learner association is an utmost essential factor needs to be considered. An effective extension program must recognize this fact and be flexible enough to refine with appropriate methodologies.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Benor D, Harrison JQ. Agricultural extension: The training and visit system; 1977. documents.worldbank.org.
2. Arunima. Role of women in decision making. Journal of Extension Education. 2001;12 (1):3015-3020.
3. Brindha N, Lanting H, Sebastin KS. Participatory approaches for development A case study on participatory approaches for Horticulture Development, Kerala. 1999;8-9.
4. Kamalakkannan K. Research and extension gaps in commercial vegetable farming in eastern Palakkad. Unpub. M.Sc.(Ag.) Thesis, KAU, Thrissur; 2003.
5. Rogers Everett M. Diffusion of Innovations (3rd ed.). The Free Press, New York; 1983.
6. Rosaish Yeluri. An Analysis of knowledge gap on FPM technologies of Cotton – A system Approach. Unpub. M.Sc.(Ag.) Thesis, AC & RI, Coimbatore; 2002.
7. FAO. Production year book. Food and Agriculture Organization of the United Nations, Rome. 1993;453.
8. The impact of farmer-field-schools on knowledge and productivity: A study of potato farmers in the peruvian andes1 by Erin Godtland†, Elisabeth Sadoulet , Alain de Janvry , Rinku Murgai and Oscar Ortiz; 2003.
9. Muhammad Abdullah, Li Cui Xia, Jia Li, Sidra Ghazanfar, Yasir Mehmood, Mazhar Nadeem Ishaq, Shah Saud. Effectiveness comparison between the farmers field school and the training and visit approaches of agricultural extension in two districts of Pakistan; 2014.
10. Rogers WI. The private sector: Its extension system the public/private coordination: In:W.M. Rivera and S.G. Schram, (eds) Agricultural extension worldwide: issues practices and emerging priorities. London: Croom Helm; 1987.
11. CIP-UPWARD. Farmer field schools: From IPM to platforms for learning and empowerment. International Potato Center – Users' Perspectives With Agricultural Research and Development, Los Banos, Laguna, Phillippines. 2003;87.
12. FAO. Kenya farmer field school networking and coordination workshop (2005). Blue Post Hotel, Thika, Kenya. 4-5 May 2005. FAO, Nairobi, Kenya. 2005; 23.
13. FAO/SAFR. Inventory and evaluation of farmer field schools in Zimbabwe. Working Document. FAO Sub-Regional Office for Southern and East Africa. Harare, Zimbabwe. 2005;79 .

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/67098