Journal of AgriSearch, 6(4):199-204
An Open Access International Peer Reviewed Quarterly
ISSN : 2348-8808 (Print), 2348-8867 (Online)
https://doi.org/10.21921/jas.v6i04.16904

LEAD Farmer Based F2F Extension Model : Role of Krishi Vigyan Kendras and Technology Adoption Determinants for Enhancing Model's Effectiveness

MS MEENA[1], RB KALE[2], SK SINGH[3] AND AK SINGH[4]
ICAR-Agricultural Technology Application Research Institute, Zone-II, Jodhpur, India

ARTICLE INFO

Received on	:	05-08-2019
Accepted on	:	23-09-2019
Published online	:	03-12-2019

ABSTRACT

A study was undertaken in collaboration with eight Krishi Vigyan Kendras (KVKs) of Rajasthan state. For data generation five Learning & Experience based Advisor (LEAD) farmers were selected by each KVK, employing socio-metric technique. Hence, data were solicited from 40 LEAD farmers from eight districts who were trained by KVKs. Role of KVKs were determined based on their Index Value (IV). Study reveals that KVKs played an important role in skill development of LEAD farmers through organisation of need based and skill-oriented trainings (IV=62) followed by front-line demonstrations on location specific agricultural technologies at farmers' fields (IV=59.42), and developing linkages between LEAD and fellow farmers (IV=58.33). Key determinants accountable for enhancing effectiveness of this model were enhanced technology adoption (IV=60.13) followed by enhanced agricultural production (IV=57.48) and productivity (IV=57.10). Study reveals that one LEAD farmer adopted 5 agricultural technologies from KVKs. Further, fellow farmers adopted 2 agricultural technologies from LEAD farmers. Hence, it was concluded that this approach may play a significant role in complementing Indian public extension system through reducing cost and coverage of more farm families. This model needs community as well as government support for sustainability and its scalability.

KEYWORDS

Krishi Vigyan Kendras, F2F extension model, Determinants, LEAD Farmer.

INTRODUCTION

In India, extension services are largely funded and delivered by central government. Public, private and corporate sectors are the main partner for pluralistic extension system which is actively engaged in performing extension services to farming community. However, the ratio of extension workers to farmers is very wide across the Indian states. For instance, ratio of extension workers and famers in Kerala state is 1:300 moreover; gap is much wider in Rajasthan state i.e., 1:2000 (Meena *et al.*, 2017). This gap is the major hindrance in delivering timely and need based advisory services in a large country like India. Due to lack of fund and staff, this approach has received considerable attention in India. Few attempts have been made by researchers to work on farmer to farmer extension (F2FE) on women advisory service providers in food processing sector in Punjab state, India (Meena and Singh, 2014). F2FE models have been widely embraced by many extension initiatives in developing countries (Hellin and Dixon, 2008; Kiptotand Franzel, 2014; Lukuyu *et al.*,2012; Meena *et al.*,2018). F2FE is a complementary approach and involves farmers sharing knowledge on agricultural innovations within their communities (Lukuyu *et al.*, 2012). F2FE models are more inclusive, low-cost, effective, and offer a wide-reaching alternative in supporting agricultural innovation (Ssemakula and Mutimba, 2011; Weinand, 2002). Henceforth, there is always search for innovative and effective mechanism to disseminate knowledge for bridging technological, extension, yield, income and other gaps at farmers' fields.

An innovative model was developed and tested by ICAR-Agricultural Technology Application Research Institute (ICAR-ATARI) Jodhpur, India under Extra Mural Project, is LEAD (Learning and Experience based Advisor) farmer approach. In this approach, LEAD farmers have shared their knowledge and information based on agricultural technologies in their farming communities.This approach assumes that LEAD farmers can effectively disseminate these innovations since they have an in-depth knowledge of local conditions, culture and practices. Concept of F2F extension is pertinent in existing situations which needs systematic interventions to develop LEAD farmers as knowledge worker. Keeping these facts in mind, present study was undertaken to study socio-economic profile of LEAD farmers; to study the mentoring role of KVK in the model, and to identify effectiveness of determinants in technology adoption.

MATERIALS AND METHODS

Location study

The investigation was undertaken in 8 districts of Rajasthan state, India, through Krishi Vigyan Kendras (KVKs). KVK is agriculture-based knowledge and resource centre established at each district in India. KVKs were selected on the basis of their highest performance index during the year 2014-15. One KVK from each host institute i.e., ICAR institutes, State Agricultural Universities (SAUs), Non Governmental Organizations (NGOs), education institutes and other organisations were included who had highest performance index. Hence, out of total 42 KVKs, KVK, Sirohi; KVK, Sriganganagar; KVK, Alwar-I; KVK, Dungapur; KVK, SawaiMadhopur; KVK, Pali; KVK, Udaipur and KVK, Tonk were finally chosen for the study (Fig. 1). From each district, 5 LEAD farmers were chosen employing socio-metric technique. LEAD farmers fulfilled following attributes;

- Frequent visits to KVKs/ICAR institutes/SAUs/State line departments associated to agriculture and allied activities,

[1]Principal Scientist (Agricultural Extension) ICAR-Agricultural Technology Application Research Institute, Zone-II (Ministry of Agriculture & Farmers Welfare, Govt. of India) Jodhpur, India.
[2]Scientist (Agricultural Extension) ICAR-Directorate of Onion and Garlic Research, Pune, Maharashtra.
[3]Director, ICAR-Agricultural Technology Application Research Institute, Zone-II, Jodhpur, India.
[4]Deputy Director General (Agricultural Extension), KrishiAnusandhanBhawan-I, ICAR, New Delhi.
*Corresponding author email: s.mohar.meena@gmail.com

- Adoption of modern agricultural technologies based on crops, animal sciences, poultry, fisheries, agricultural engineering, etc.
- Frequent use of Information and Communication Technologies (ICTs), and
- Frequent interaction and guidance to fellow farmers.

LEAD farmer based F2F extension approach has been developed and tested by ICAR-ATARI, Jodhpur, India under Extra Mural funding from Indian Council of Agricultural Research, New Delhi.

Fig. 1: Selected KVKs from Rajasthan state, India

Table1: Description summary of socio-economic variables of LEAD farmers

Demographic attributes	Definition
AGE	Age of the respondents in years
GENDER	State of being male or female (Male=1 and Female=2)
EDU	Number of years spent by respondents in formal education (Illiterate=0; up to 5th=1; up to 8th=2; upto10th=3; upto12th=4; Graduate=5; and Post-graduate=6)
CASTE	Form of social stratification in Indian society (General=1; OBC=2; ST=3; SC=4)
RELIGION	Religion is a set of beliefs which held by a group of people (Hindu=1; Muslim=2; and Sikh=3)
EXP	Working experience in agriculture (in years)
FSIZE	Total number of individuals in a family
LHOLDING	A piece of land owned or rented by respondents
AINCOME	Total amount of income earned annually by an individual
EARNERS	Total family members who earns for the livelihood
TRG	Training attended by an individual in diverse fields of agriculture. (Crop based:1; Horticulture=2; Dairy=3; Fishery=4; Poultry=5; and others=6)

Measurement of variables

Socio-economic variables included age (AGE), gender (GENDER), education (EDU), caste (CASTE), religion (RELIGION), experience (EXP), family size (FSIZE), land holding (LHOLDING), annual income (AINCOME), earners (EARNERS) and training (TRG). For measurement of these variables, suitable schedules were developed (Table 1).

Garret ranking method was employed to identify and for prioritisation of determinants. LEAD farmers have been interviewed to indicate importance of influencing factor by employing rank 1 to the most key factor, rank 2 to the second key factor and so on. The percentage score for each rank from 1 to 10 were calculated. The percentage score thus obtained for all the ten ranks were converted into scale values using Scale Conversion Table given by Henry Garrett. Scale values obtained for first rank to tenth rank were 81, 69, 62, 55, 50, 45, 38, 31, and 19, respectively. Factors or determinant analysis is presented in Table 4. The score value (fx) was calculated for each factor by multiplying the number of respondents (f) with respective scale values (x). Thus, total scores were found by adding score values (fx) of each rank for every factor. Mean score was then calculated to know the order of preference given by LEAD farmers for the factors. Based on mean score, overall ranks were assigned to each factor. Role of KVKs in mentoring LEAD farmers were measured on the basis of Index Values. Ranks of most preferred roles were given based on highest index of individual roles.

LEAD farmer based F2F extension model

Approach assumes that LEAD farmers can effectively disseminate innovations since they have an in-depth knowledge of local conditions, culture, and practices and are known by other farmers and hence have their trust. LEAD farmer based F2FE model evolved to overcome the constraints of limited availability of extension workers to disseminate huge information to a large number of farmers. Components of F2F extension model is given in Fig. 2.

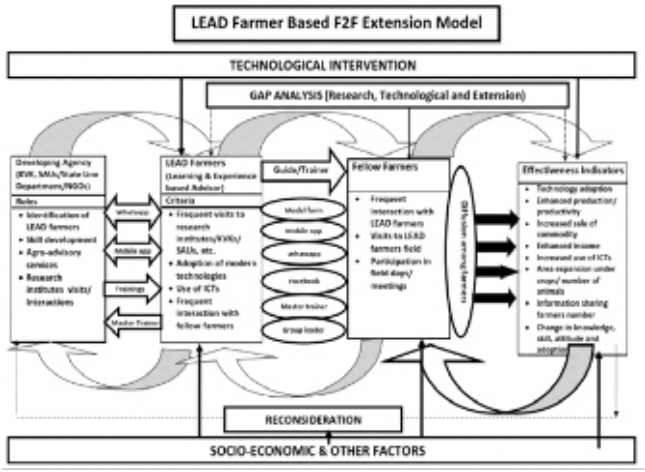

Fig. 2: LEAD farmer based F2F extension model

Source : Meena *et al.* (2017)

Gap analysis

Various institutes such as ICAR Research Institutes, KVKs, SAUs, NGO, line department etc. are implementing different

projects/schemes for transfer of location specific agricultural technologies to the farmers/farm women. These institutes identify gaps in the field of research, extension and technology to find out solutions and making interventions for betterment of society.

Technological interventions

After identifying problems and gaps, interventions were needed to improve situation. These institutions find out technological options through research and development policies or from available technological options for solving the problems and minimizing the gaps.

Role of mentoring/developing agency

Many public funded organisations are engaged in execution of government scheme/projects like KVKs, State Agricultural University, Non-governmental organisations, and state line departments. Hence can play a crucial role in development and promotion of F2F extension model. These institutions can effectively mentor and utilise the LEAD farmers. However, in this project, KVKs were the key mentoring agency involved in each stage of development of LEAD farmers. The specific roles of these organisations are:

- Identification of LEAD farmers
- Skill development of the LEAD farmers
- Providing agro-advisory services
- Holding interactions and visits to research institutes.

Identification of LEAD farmers

The socio-metric technique was employed by KVKs in selection of LEAD farmers. KVKs also imparted the skills of LEAD farmers after analysing critical gaps. Those farmers selected to lead "farmer-to-farmer" extension is often called model, master or lead farmers and are chosen based on their agricultural expertise. Here we used the term "LEAD". These institutes provide advisories to the LEAD farmers through Mobiles based WhatsApp, face book, mobile apps and trainings. LEAD farmers are also used as master trainers in various trainings conducted by these agencies. The specific roles of these institutes in F2FE Model are:

- Training to upgrade knowledge and enhance skills
- Improving social network and rapport building
- Recognized them as master trainer
- Community institutional building
- Development of leadership through group formation
- Identified as facilitator for conducting various programmes in the villages to link with farmers and to mobilize communities for meetings and training
- Demonstrations of technologies on the farmers' fields
- Monitor/supervise project activities.

These LEAD farmers disseminate information available with them to fellow farmers through Mobiles based WhatsApp, face book, mobile apps and trainings. They also act as model farmers and master trainers for training to fellow farmers. These LEAD farmers always lead by example by practicing what they are taught on their own fields. LEAD farmer is chosen by other farmers to represent them in agricultural development and train them to use the new technologies. This approach reduces workload of extension agencies with least cost. To reach a maximum farmer within short time and cost this mode is found very suitable and effective.

RESULTS AND DISCUSSION

Profiles of LEAD farmers

LEAD farmers act as local leader to disseminate farm technologies and serve as guide or innovations to fellow farmers. Hence, study of socio-economic attribute of LEAD farmers is important (Table 2). Age of an individual influences his mobility, energy level and decision-making capability in his whole lifetime. In this study, it was noted that most of the LEAD farmers (55%) belonged to age group from 35 to 58 years. Gender of sampled LEAD farmers was found to be predominantly of males (95%). The majority of the farmers had education up to 10th and 12th (12% each) followed by under-graduation (15%). Most of the LEAD farmers belonged to other backward category followed by general category (35%). Indian society is a traditionally Hindu dominating; therefore, it was obvious that most of LEAD farmers (92.50%) belong to Hindu religion. Experiences of LEAD farmers in agriculture and allied activities indicate that knowledge and decision-making capabilities acquired over a period of time. High level of experience i.e., 16 to 32 years was found among 37.50% LEAD farmers.

Majority of LEAD farmers (87.50%) had 4-11 members in their family and had (67.50%) 2 to 15 ha. land holding. Majority of LEAD farmers' (75%) income was below Rs.777000 while 25% LEAD farmers had more than Rs.777000 annual income. Study reveals that mostly earners in the family of LEAD farmers (67.50%) were found from 2 to 4 members. Capacity of LEAD farmers was built in many diverse areas, in which 80% respondents obtained training in agri-based areas followed by horticulture (65%) and dairy (55%). (Table 2.)

Table2 : Demographic attributes of LEAD farmers, Rajasthan state, India (N=40).

Demographic attributes	*f*	%
Age (in years)		
Young (<34)	9	22.50
Middle (35-58)	22	55.00
Old (>58)	9	22.50
Gender		
Male	38	95.00
Female	2	5.00
Education		
Illiterate	1	2.5
Up to 5th	5	12.50
Up to 8th	4	10.00
Up to 10th	10	25.00
Up to 12th	10	25.00
Under-Graduate	6	15.00
Post-Graduate	4	10.00

Caste		
General	14	35.00
Other backward caste	20	50.00
Scheduled tribe	5	12.50
Scheduled caste	1	2.5
Religion		
Hindu	37	92.50
Muslim	2	5.00
Sikh	1	2.50
Experience (in years)		
Low (<16)	13	32.5
Medium (16-32)	15	37.5
High (>33)	12	30
Family Size		
Low(<4)	1	2.50
Medium (4-11)	35	87.50
High (>11)	4	10.00
dlhan lding		
Low<2	4	10.00
Medium 2-15	27	67.50
High >15	9	22.50
Annual income (in Rs)		
Low<777000	30	75.00
Medium777000-2664000	8	20.00
High >2664000	2	5.00
Number of earners in family		
Low (<2)	9	22.50
Medium (2 -4)	27	67.50
High (>4)	4	10.00
Training obtained		
Crop based	32	80
Horticulture	26	65
Dairy	22	55
Fisheries	3	7.5
Poultry	5	12.5
Other	7	17.5

Mentoring role of KVKs in F2F extension model

To realize their real potential, farmers must have access to state-of-the-art technologies, necessary inputs and related information. In this context, Government of India through the Indian Council for Agricultural Research (ICAR) has established a large network of over 714 KVKs. KVKs are playing a proactive role in transferring the new technology at field level with tangible beneficial impacts. They have an edge in technology transfer over other service providers by virtue of having better technical expertise and demonstration units. KVKs played a significant role in mentoring LEAD farmers at district level (Table 3). LEAD farmers responded that KVKs have provided need based and skill-oriented trainings for improving their knowledge and skills level with highest Index Value (IV) as 62%. Henceforth, they can better guide the fellow farmers in diffusion of agricultural knowledge in real farming situations. KVKs have also demonstrated location specific agricultural technologies (IV=59.42%) in a participatory mode. KVK followed principals of "*seeing is believing*" and "*learning by doing*" on the part of LEAD farmers. As a third important role, KVKs have developed linkages (IV=58.33%) between LEAD farmers and fellow farmers through conducting Cluster Front Line Demonstrations (CFLDs) illustrated potentiality of newly released varieties. KVK provided a platform to share the agricultural experiences amongst the fellow farmers.

Table 3 : Mentoring roles of KVKs perceived byLEAD farmers, Rajasthan, India (N=40)

Role of KVKs	IV	Rank
Conductance of training to improve the knowledge and skills	62.00	1
Guiding and demonstrating location specific agricultural technology	59.42	2
Developing linkage between LEAD and fellow farmers	58.33	3
Market information and linkage with distance market	47.58	8
Developing LEAD farmers as a group leader	52.75	5
Guidance on technological packages	48.67	7
Facilitation to LEAD farmers on input supply	52.33	6
Advisory role on crop enterprise	54.00	4
Advisory on dairy enterprise	30.58	9

- KVKs are providing agricultural technologies to the LEAD farmers and their scientists are working as social change agents. They are putting stress on providing marketing information and linked these entrepreneurial activities with market for its sustenance (IV=47.58%).
- LEAD farmers acted as advisor to the fellow farmers on crop enterprises (IV=54%) since their fields are used as demonstrating units. Discussions held during field days organised by KVKs made it possible to interact the scientists, LEAD farmer and fellow farmers at a single platform. During discussions, technological package of demonstrating varieties of a particular crop are thoroughly discoursed (IV=48.67%).
- Most of the LEAD farmers are self-motivated individuals who are willing to share knowledge and skills with fellow farmers. However, KVKs have developed leadership qualities among LEAD farmers through conducting trainings and identified them as resource persons at KVKs programmes. Hence, LEAD farmers acted as group leader (IV=52.75%) and could share experiences among other farmers/farm women. KVK have conducted on-farm trials and front-line demonstrations on latest agricultural technologies. LEAD farmers perceived the advisory role of KVKs especially on animal and dairy sector (IV=30.58%).
- KVKs played a critical role as facilitator in input supply (IV=52.33%) to support farming community. KVKs are also enable farming community to easily access the latest information on technology, package of practices, input sources, market channels and financial assistance and to

promote single window delivery of need-based services in agriculture and allied sector.

Effectiveness of determinants of F2F Extension model

Determinants are the factors which decisively affects the outcome of extension model. For any extension model to be deemed effective, it should be able to improve production and productivity and at the same time be readily available and accessible (Rivera and Carry, 1998). Past extension services models lacked these vital requirements and thus proved ineffective. Under this study, identification, prioritization and ranking analysis of key determinants of effectiveness of F2F extension model as perceived by LEAD farmers is given in Table 4.

Table 4: Prioritization of determinants of effectiveness of F2F extension model, Rajasthan, India (N=40)

Factors	Rank	I	II	III	IV	V	VI	VII	VIII	IX	Total	Total	Mean	Rank
	Scale Value	81	69	62	55	50	45	38	31	19	Score		Score	
Enhanced productivity	F	13	5	3	4	4	2	1	0	8				III
	Fx	1053	345	186	220	200	90	38	0	152	2284	40	57.1	
Enhanced production	F	2	9	12	6	2	3	3	3	0				
	Fx	162	621	744	330	100	135	114	93	0	2299	40	57.48	II
Enhanced technology adoption	F	6	13	7	3	1	3	3	4	0				
	Fx	486	897	434	165	50	135	114	124	0	2405	40	60.13	I
Capacity building of fellow farmers by LEAD farmers	F	5	3	1	4	2	2	4	3	16				
	Fx	405	207	62	220	100	90	152	93	304	1633	40	40.83	IX
Access to information	F	4	1	7	6	8	4	6	3	1				
	Fx	324	69	434	330	400	180	228	93	19	2077	40	51.93	IV
Social recognition	F	3	3	3	4	10	5	1	8	3				VI
	Fx	243	207	186	220	500	225	38	248	57	1924	40	48.1	
Enhanced income	F	3	6	2	7	3	4	7	5	3				
	Fx	243	414	124	385	150	180	266	155	57	1974	40	49.35	V
Enhanced knowledge, skill, attitude & aspiration	F	1	0	4	2	6	7	11	7	2				
	Fx	81	0	248	110	300	315	418	217	38	1727	40	43.18	VII
Enhanced sell of commodity	F	3	0	0	4	5	10	4	7	7				
	Fx	243	0	0	220	250	450	152	217	133	1665	40	41.63	VIII

Significant contribution of agricultural modern technologies to economic growth can only be realized when and if the modern technology is widely diffused in the social system and adopted. Hence, an understanding of factors affecting diffusion and adoption is essential. KVK is the district level knowledge and resource centre, played a significant role in diffusion of many agricultural technologies to LEAD farmers.

Enhanced technology adoption

Enhancing technology adoption is one of the determinants of effectiveness of F2F extension model. Study reveals that on an average, LEAD farmer adopted 5 agricultural technologies from KVKs. Hence, enhanced technology adoption was observed as first important determinant of F2F extension model with highest IV (60.13).

Enhanced production and productivity

Enhanced production (IV=57.48) and productivity (IV=57.10) were found to be second and third important determinants, respectively. Since the productivity is a measure of efficiency of farmers' production, defined as total output per one unit of a total input. Higher productivity leads to higher real income, ability to enjoy more leisure time and better social services, such as health and education. These all things are leading to higher living standards.

Enhanced income

Enhanced agricultural income was found to be fourth important indicator of effectiveness (IV=51.93). It gives information on viability of agricultural sector and especially considered for policy perspectives. They adopt sustainable

and diversified agriculture. Being innovative farmers, work as knowledge providers to fellow farmer. Recognition of their own innovations could help in out scaling the economically efficient farming practices.

Social recognition

Knowledge of LEAD farmers is enhanced through interaction and trainings provided by KVKs, SAUs and other institutions. This enhanced knowledge enables them to take leading role in the community. Recognizing successful LEAD farmers not only pays tribute to individuals, but also draws attention to entire field of farming. They also *bring* importance *of* agriculture into focus. Hence, social recognition was ranked as fifth important determinants (IV=49.35).

Enhanced knowledge, skill, attitude and aspiration

Knowledge, skill, attitudes and perceptions in relation to benefits and challenges of the technology play a key role in the decision making to adopt the technology. Hence, enhancing knowledge, skill, attitude & aspiration (IV=48.10) was well-thought-out as determinant by LEAD farmers.

Enhanced sell of commodity

Enhanced sell of commodity (IV=43.18) is needed for better marketing, considered as one of the determinants.

Capacity building of fellow farmers by LEAD Farmers

In the capacity building, LEAD farmers play trainer's role which was noticed as one of determinants of effectiveness (IV=41.63).It fosters next generation of agricultural entrepreneurs who will create viable farm businesses. It helps to incorporate latest scientific advances and technology tools into their daily operations. KVKs are playing an important role in transforming the rural India. A number of farmers are doing various innovations that should be taken a note of. There are increasing efforts from part of the government to strengthen existing more than 700 KVKs to carry out its wide range of mandated activities and initiation of new components. This model proved that one LEAD farmer adopted 5 agricultural technologies from KVKs, and further trained232 fellow farmers, expanded 14 ha area under crops. The fellow farmers adopted 2 agricultural technologies from LEAD farmers. This approach needs community as well as government support for sustainability and scalability (Meena *et al.*, 2018).

CONCLUSION

KVKs of Rajasthan state have proved and demonstrated significant role in mentoring LEAD farmers. KVKs organised need based and skill-oriented trainings followed by front-line demonstrations on location specific agricultural technologies at farmers' fields and developed linkages between LEAD and fellow farmers. Key determinants for enhancing the effectiveness of model were enhanced technology adoption followed by enhanced agricultural production and productivity. One LEAD farmer adopted 5 agricultural technologies from KVKs.

Further, fellow farmers adopted 2 agricultural technologies from LEAD farmers. Hence, this approach can play a significant role in complementing public extension system through reducing cost and coverage of more farm families in India. However, model needs community as well as government support for sustainability and its scalability. Key issues which have implications for sustainability of this model are; identification of LEAD farmers, technological backup for LEAD farmers, involvement of local institutions, pertinent motivational & compensation for LEAD farmers, and participation of women as LEAD farmers.

ACKNOWLEDGMENTS

Authors extend sincere thanks to Indian Council of Agricultural Research for funding the extra mural project.

REFERENCES

Hellin J and Dixon J 2008. Operationalising participatory research and farmer-to-farmer extension: the Kamayoq in Peru. *Development in Practice* **18** (4-5): 627-632.

Kiptot and Franzel S.2014. Voluntarism as an investment in human, social and financial capital: evidence from a farmer-to-farmer extension program in Kenya. *Agriculture and Human Values* **31**(2): 231-43.

Lukuyu B, Place F, Franzel S and Kiptot E. 2012. Disseminating improved practices: are volunteer farmer trainers effective? *The Journal of Agri.l Edu. and Extension* **18**(5): 525-40.

Meena MS and Singh KM 2014. Women Advisory Service Providers in Food Processing Sector: Case of Punjab, India. Published by Global Forum on Agricultural Research. Available: http://www.egfar.org/sites/default/files/mohar_meena-women_ advisory_service_providers_in_food_processing_ sector.pdf

Meena MS, Kale RB, and Singh SK. 2017. Effectiveness of farmer to farmer extension model to enhance the technology uptake in Rajasthan state, Technical bulletin, 1/2017, published by ICAR- Agricultural TechnologyApplication Research Institute, Jodhpur 1-12.

Meena MS, Kale RB, and Singh SK. 2018. LEAD Farmer based Farmer to Farmer Extension Model: SWOT Analysis and Sustainability Issues in Indian Context.Lead paper published in Souvenir of National Seminar on Extension Strategies for Doubling the Farmers' Income for Livelihood Security organised by Society of Extension Education, Gujarat and Anand Agricultural University, Anand, Gujarat, India, during 26-27 April, 2018.

Rivera WM and Carry J. 1998. Privatising agricultural extension Worldwide: Institutional Changes in funding and delivering agricultural extension: in BE Swanson, ed. *Agricultural extension: reference manual (3rd ed.)* FAO. Rome, 1998.

Semakula E and Mutimba JK. 2011. Effectiveness of the farmer-to-farmer extension model in increasing technology uptake in Masaka and Tororo Districts of Uganda. *South African Journal of Agricultural Extension* **139**(2): 30-46.

Weinand J.2002. Farmer-to-farmer extension: Opportunities and constraints of reaching poor farmers in southern Malawi. Unpublished Master's Thesis. University of Hohenheim, Germany.

Citation:

Meena MS, Kale RB, Singh SK and Singh AK. 2019. LEAD farmer based F2F extension model: role of krishi vigyan kendras and technology adoption determinants for enhancing model's effectiveness. *Journal of AgriSearch* **6**(4): 199-204