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Redefining the Roles of Extension Scientists in KVKs: Innovative Experiments during COVID Pandemic in KVK, Thiruvarur, Tamil Nadu, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Commentary

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ABSTRACT

Extension Scientists working in Krishi Vigyan Kendras (KVK) have to innovate to prove their inevitable role in KVK and to establish their ability to spawn team work culture in KVK to reach the

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farmers effectively. In this article, an effort has been made to document the innovative strategies adopted by the Extension Scientist in Krishi Vigyan Kendra, Thiruvarur located in Cauvery Delta region of Tamil Nadu in India. Thirteen innovative strategies adopted have been detailed with lucid explanation. Descriptive research design has been used to document most of the strategies detailed in this article while Expost Facto research design was used for the research taken up with School Children. The innovate strategies like KVK on the Move, utilising school children as Para Extension Workers, using social networking tools for technology transfer have hogged the limelight. Training in Hybrid mode during COVID Pandemic period, uploading of Youtube videos, innovative diagnostic advisory sheet, Participatory training Evaluation, Creative Exhibition, Innovating in mobilisation of FPOs and documentation of Farmers Innovations are the other Innovative Strategies employed by the KVK, Thiruvarur. Every strategy has envisaged the participation of farmers and scientists of KVK in a partnership mode which has resulted in long lasting relationship between them which culminates not only in delivering the mandate of the KVK but also transform the Farmer-Scientist Linkage substantially.

Keywords: Krishi Vigyan Kendra; innovative extension strategies.

1. INTRODUCTION

Krishi Vigyan Kendras are more amenable for Extension Scientists to try new ideas or to spawn their innovations. Only requirement on the part of the Extension scientists is to have a bent of mind to innovate and to get along with the other SMS who are working in the KVK system [1-3]. When compared to any other systems like Agricultural Colleges, Agricultural Research stations, KVKs provide huge space for Extension Scientists to think and Innovate. Sky is the limit for the Extension Scientists to carry out whatever he/she thinks provided he or she should possess impeccable enthusiasm to work in the system and to go to field to learn from farmers and to intervene innovatively.

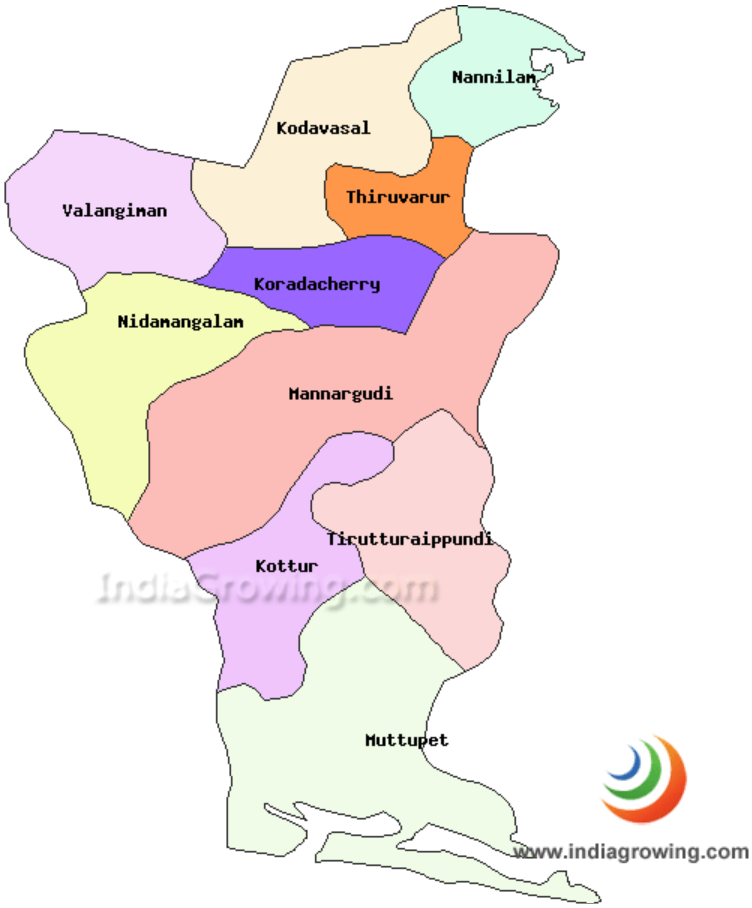
KVK, Thiruvarur is one of the prominent KVKs in Tamil Nadu in terms of its locality and the striking activities. Located in the heart of the Cauvery Delta, the farmers demand from the KVK is ever increasing and past few years has seen the KVK in cloud nine due to the plethora of Extension innovations that the scientists of KVK have introduced to reach out to farmers. During COVID pandemic KVK, Thiruvarur was on its feet to reach the unreached farmers. This article is an epitome of the innovative Extension activities that has been carried out by the scientists of KVK, Thiruvarur.

2. MATERIALS AND METHODS

2.1 Study Area and Methodology

This is a documentation of innovative Extension Stragegies adopted by KVK, Thiruvarur and hence the entire Thiruvarur District is the study area as the innvoative stragegies detailed in this article has been experimented in ten blocks of entire Thiruvarur District. The map showing the study area is given below:

Tamil Nadu Map



Thiruvarur District Map

Since this article is basically an epitome of the documentation of Innovative strategies which were tried in KVK, Thiruvarur, descriptive research design has been chosen. Each of the innovations has been described in a detailed manner which involves why and how the innovation impacted the functioning of KVK. Though Descriptive research design is used through out the article, for the innovation of utilising school going children of farmers as Para Extension Agent, we have used Experimental Research design to find out the significant change between treatments. Mean Knowledge Index, Mean Adoption Index and Mean Communication Effectiveness Index were the measures operationalised for this study and the results were presented.

The following is the methodology adopted for measurement.

Knowledge Index is the ratio between number of practices known to parents of respondents and number of practices taught to respondents through sessions which was multiplied by 100.

Adoption Index is the ratio between number of practices adopted by parents of respondents and number of practices taught to the respondents through sessions which was multiplied by 100.

Communication Effectiveness Index- Sum total of number of interactions between parents and their wards, Degree of Pacifying ability of respondents, following up of information by respondents. Number of Interactions between parents and wards was measured with a scoring procedure that '3' score for more than 6 interactions, '2' for 3-6 interactions and '1' for less than 3 interactions. Degree of pacifying ability was measured with a scoring procedure that '3' score for highest degree , '2' for moderate degree and '1' for lesser pacifying ability. Following up of information by respondents was measured with a scoring procedure that '3' score for highest degree of follow up , '2' for moderate degree of follow up and '1' for lesser follow up:

2.1.1 "KVK on the Move" (Block Advisory Meet) as a platform to reach the unreached farmers during COVID 19 Pandemic

One important problem that the farmers have been facing during COVID 19 Pandemic is that they could not come to KVK to get their problems solved due to travel restrictions. In order to address this issue, the KVK scientists design an innovative model called "KVK on the Move" which has the following advantages.

- As of now, there is no unified platform for the meeting of Extension personnel, farmers and Scientists at block level due to which many of the relevant problems are not getting noticed
- Farmers from distant area are not getting served by KVK and they are crying for a platform to get their problems solved
- Only few agricultural problems of a particular block is getting visibilised. Meeting more number of farmers who could not visit KVK will result in diversity of issues coming to the fore.

The block level line department officials were intimated about the event well in advance. The farmers were intimated through dept. officials, Karaikal FM, print media and whatsapp groups. The event was conducted on a stipulated date during which the team of KVK scientists visited Block Extension Centres wherein the farmers have given with solutions for the problems along with Line dept. officials.

Through this innovative initiative, 558 Farmers in 10 blocks were given with 128 advisories which culminated in the addition of 5525 new farmers to the data base of the KVK (Fig.1).

Graph 1, clearly depicts the issues brought by farmers for getting solutions in KVK on the Move programme. Coconut Rugose white fly, Pulses Yellow Mosaic virus, cotton sucking pests, soil salinity management are the major issues flagged by farmers. Another important observation is that besides agricultural issues, animal husbandry issues also were brought to the fore which is the sheer advantage of this programme. All advice in one roof with strong Extension workers-Researchers-Farmers linkage are the twin benefits that this innovative ideas has achieved. This model can be replicated in other KVKs also.

2.1.2 Utilising the School going Children of Farmers as Para-Extension Agents

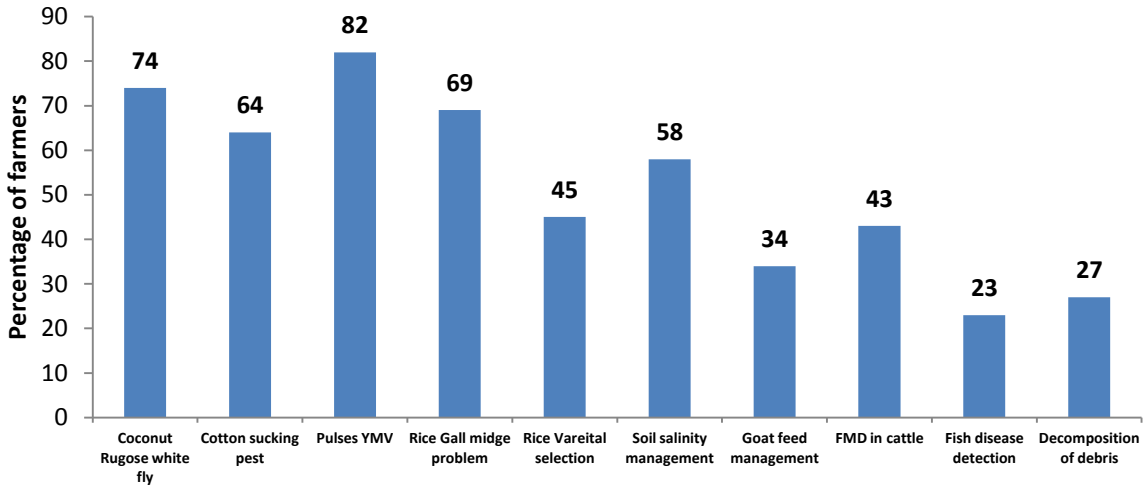
There is serious discourse among Extension Scientists to find out right mix of medium for transfer of technologies. Rather than Extension worker from outside the society, an insider can deliver better which has been substantiated through several studies and in the recent past the input dealers have been trained for this. Though, there is a caveat that whether the input dealers/pesticide shop owners will deliver technologies without prejudice is a million dollar question [4,5]. Hence, an innovative idea has been conceptualised wherein school going children of the farmers were trained to serve as para Extension agent and we have recorded positive results.

There are three reasons which can be quoted as rationale of such employing this initiative.

- Though pluralistic Extension is in place, adoption percentage is low
- Farmer: Extension worker ratio has been drastically reduced
- The children of the farmers can act as bridge between research system Extension workers and farmers

Three Experimental treatments were taken up wherein the treatment 1 involved the sons/daughters of farmers pursuing 8th to 10th standard and the treatment 2 involved the sons/daughters of farmers pursuing 11th to 12th standard. In order to find out any significant change in terms of gender, we have included 60 male (Sons of farmers) and 60 female (Daughters of farmers) students and they were given with four sessions each and a control was kept to find out the effect of the treatment. The schools have been informed about the experiments and proper approval was obtained from school administration. The season coincided the pulses cultivation which has been taken up by farmers after Thaladi season is over. Some farmers used to go for Rice fallow pulses and some used to go for pure crop. Hence technologies related to pulses has been given to students during the four sessions.

Fig. 1. Snapshots of KVK on the Move programme



Graph 1. Distribution of problems addressed through KVK on the Move Programme

Table 1. List of Experimental Treatments

Experimental Treatments	No. of Trials	Mean Knowledge Index (Number of practices-12)		Mean Adoption Index (Number of practices-12)		Mean Communication Effectiveness Index (Max.score:9.0)	
		Male (n=60)	Female (n=60)	Male (n=60)	Female (n=60)	Male (n=60)	Female (n=60)
T1: Sons/Daughters of farmers pursuing 8th class to 10th class	4 sessions	75.22	83.21	43.42	49.74	6.2	7.1
T2: Sons/Daughters of Farmers pursuing11th class to 12th class	4 sessions	66.61	74.21	38.33	41.21	5.3	5.9
Check- Farmers who rely on regular mode of getting information	Not applicable	42.15		22.31		Not applicable	

The results given above in Table 1 indicated that the daughters of farmers rather than sons of farmers were better communicators and that too daughters of farmers pursuing 8th to 10th standard rather than Higher secondary class did possess the skill of convincing their father to adopt technologies. This experiment requires to be further validated and hence in the coming years this will be taken as a Front Line Demonstration by the scientists of KVK, Thiruvarur.

2.1.3 Augmenting the potential of social networking tools for technology transfer

The Information and Communication Technology tools have transformed the way the Agricultural Technologies are transmitted. Gone are the days, the Extension worker had to visit individual farmers households. Now within a mouse click or touch on the mobile phone, the farmers could get technologies with greater pace which has removed the spatial and temporal barriers of communication [6,7]. The KVKs which are the custodian of technology transfer at District level has to fastly embrace the ICT enabled Extension. Already it is happening in many KVKs. KVK, Thiruvarur is not an exception and the scientists have meticulously used the Whatsapp platform for technology transfer.

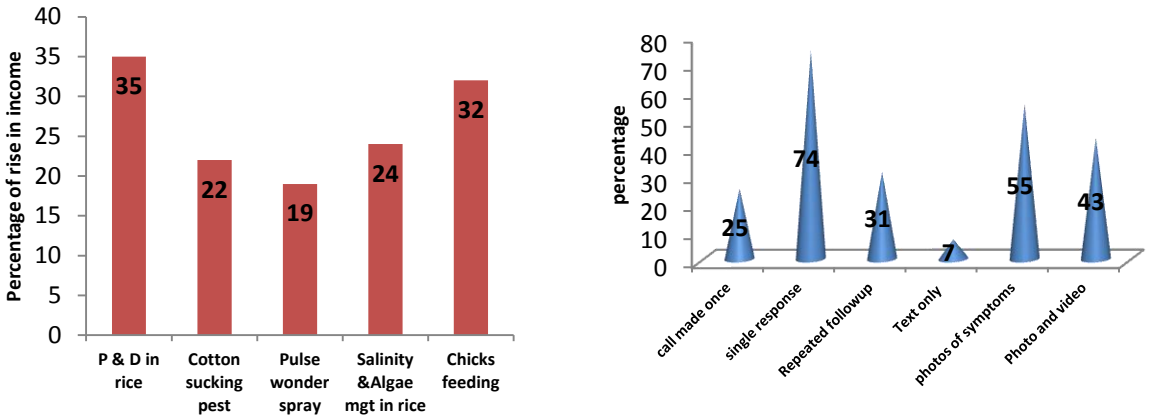
Besides having an exclusive whatsapp in the name 'Thiruvarur KVK', the scientists of KVK have been sending and receiving information from almost ten farmer's whatsapp group. The member of Thiruvarur whatsapp group used to send the technical information to many farmer's whatsapp group and thus the reach of the KVK has been increased manifold. A survey was taken up to understand the impact of technology delivery whatsapp platform among 130 android mobile using farmers who have constantly been in touch with scientists of KVK through Whatsapp.

Graph 2 clearly revealed the economic impact of whatsapp advisory. The farmers could realise 35 percentage of increased income from resorting to advice of KVK scientists on Pest and Disease management in rice through application of correct chemical and reducing cost of visiting KVK. This was followed by Chicks feeding in which 32 percent increased income was realised by farmers. The analysis of pattern of whatsapp advisory given in right side figure revealed that surprisingly 55 and 43 percentage or whatsapp users used to send photos of symptoms alone and video of the symptoms respectively. The encouraging trend is that farmers have been increasingly adept in sending photos, videos of symptoms and got their problems solved without visiting KVK. The following are the snapshots of whatsapp advisory given to farmers. Fig. 3 clearly depicts how whatsapp advisory is being used by farmers.

2.1.4 Spawning Multidisciplinary working culture in KVK

Though, KVK is a platform where SMS from different disciples work together. In reality, there are working in water tight compartments and often one cannot see multidisciplinary work culture in addressing farmers problem. In order to stimulate this culture, in selected Front Line Demonstrations proposed by other scientists, the Extension scientist has been involved. For example, the in varietal demonstrations the role of Extension scientist is essential to find out the acceptance of the variety, its social and economic impact and attributes of the variety which determine the diffusion.

Fig. 2. Experiments on School Children as Para Extension Workers



Graph 2. Economic impact of whatsapp advisory

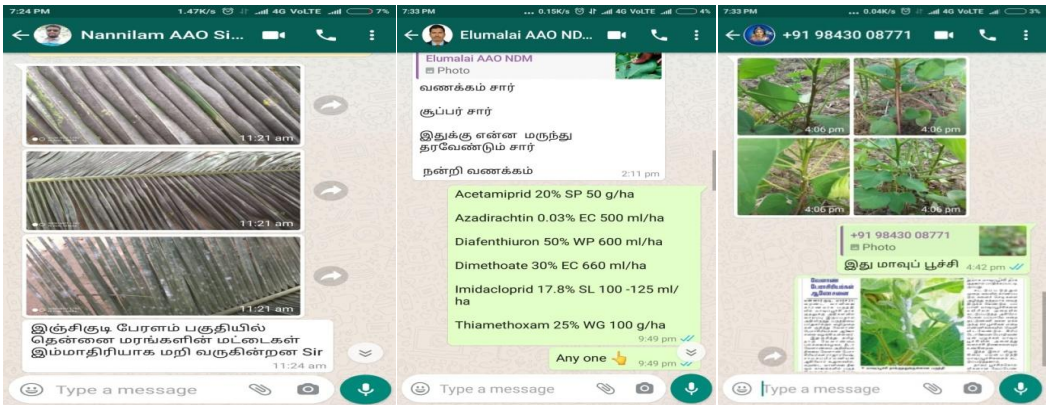


Fig. 3. Communication through social network

Frontline Demonstrations

FLD No:	3	Title :	Demonstration of Newly released medium duration fine grain Paddy variety VGD 1 with ICM in Thiruvarur District (2nd Year)

Proposing Scientist

Name:	Dr.Selvamurugan,M Dr.M.Ramasubramanian	Designation and discipline:	SMS Environmental Science Programme Coordinator and Associate Professor (Agrl.Extension)

Replications/ Beneficiaries:	10	Location	Edamalaiyur village of Needamangalam block	Season	Rabi 2022

OFT converted to FLD or Direct FLD:	Direct FLD
Technology	Paddy Seed VGD 1 @ 60 kg / ha + Application of Fertilizers based on STCR + TNAU wetland Micronutrient mixture@ 25 / ha + Bio-fertilizers @ 2kg/ha
Source and year	TNAU 2020
Farmers Practice	Other varieties practicing in farmers field
Parameter(s)	Growth parameters, yield and yield attributes, soil fertility status (SMS-Environ.Science) Acceptance, Determinants of Adoption, possibilities of diffusion, Partial budgeting comparing previous vareity and VGD 1 (Agricultural Extension)
Critical inputs	Seed, biofertilizers and other inputs
Cost per replication (Rs.)	2500
Total Cost (Rs.)	25000 (Inputs) + Conducting Particpatory workshops with farmers (3000) = 28000

Fig. 4. Multidisciplinary Front Line Demonstration

For example VGD 1 is a recently released briyani rice variety which has hogged the limelight. While designing the FLD, the Extension scientist was also involved as a co-scientist along with an Environmental Scientist who has originally proposed the FLD. Along with agronomic parameters, the parameters like acceptability, determinants of adoption, partial budgeting to find out the real economic impact of the variety juxtaposing the variety which they have planted before were also collected and analysed which gave the FLD a value addition.

2.1.5 Innovative designing of trainings in hybrid mode

The COVID 19 pandemic, though it has created havoc among people, it has brought to light unexplored dimensions of technology delivery. Online trainings/conferences/Consultations have become more popular. Though many KVKs have been hooked onto online mode of training farmers, the KVK, Thiruvarur have innovatively designed the online trainings in terms of subject and delivery [8,9]. On contrary to regular topics given by KVKs, KVK, Thiruvarur has identified the following areas which were ignored but assumes lot of importance.

- Successful farmers discussion forum
- Training Agro Input Dealers on plant protection
- Online awareness on schemes of Devt.Depts.
- Invertebrate pest management
- Mites and nematode management

Some of the trainings warranted the physical presence of farmers. In such trainings hybrid mode of on and off line has been resorted to. For example a training on repair and maintenance of Farm implements was given through hybrid mode. Farmers not only in Thiruvarur District but from all over the state and nation took part in online trainings. This has given rise to a thought that in future online trainings may be recommended as a cost effective quick reach training methodology to be adopted by KVKs and other training institutions.

2.1.6 Youtube videos to reach wider mass of farmers

Youtube has become an important mode of communication which can effectively disseminate skill part of a technology which triggers lot of discussion among farmers and ultimately one video has a huge effect than thousand pages of written text. Keeping in view the reach of Youtube videos, KVK, Thiruvarur has come up with a youtube channel called "Nerkalanjium" through which we could reach thousands of farmers. These videos have been uploaded in KVK website also besides forwarded to various whatsapp groups as mentioned above. A forte of the videos is its shortness and authenticity. Three minute videos have been edited and posted. Certain videos like millets in Cauvery delta had abundant views. So far more than 30 videos have been uploaded and their URL is given in Fig.5.

2.1.7 Innovative diagnostic advisory sheet

Diagnosis of field problems of the farmers is one of the important function of KVKs. Either in the field or from the symptoms brought to the KVK by the farmers, the problems will be diagnosed and the solutions will be given. Though this has been happening continuously in all KVKs, a proper documentation is not there. Despite the fact that certain KVKs are adept in giving field diagnostic advisories to the farmers, they are not being documented properly for future reference. Hence an innovative Diagnostic Advisory Sheet has been designed by the KVK Scientists in Thiruvarur and it is given in Fig. 6.

The uniqueness of the sheet is that it contains the date of diagnosis, photograph and full address and contact details of the farmer, the photograph of symptoms of the plants brought by him, the details of diagnosis, the scientist who diagnosed it and his/her signature. More importantly, the feed back of the farmers after some time has also find a place in the advisory sheet which will be useful to get to know the appropriateness of advisories given and this is an indirect way of assessing the impact of field diagnostic advisories of KVK.

In the long run, such documentation will be very useful in the following ways.

- What are the major issues of the farmers
- Are the issues changed over years
- Are there any changes between different blocks in the district pertaining to a problem
- In which of the season a particular field problem raised often
- What are the suggestions offered by scientists

- Are the suggestions effective in tiding over the farmer's problem

2.1.8 Strengthening the Bond with Farmers and Media Personnel

Krishi Vigyan Kendras are district level Extension institutions which can reach the farmers in entire district which is not often possible with the available human resources. Only six SMS and a Programme Coordinator is there in a KVK who could not reach the entire district practically. Hence, the KVK scientists should make use of media personnel both print and electronic media to transfer technologies to wider mass of farmers.

KVK, Thiruvarur has a strong linkage with vernacular media in the district, due to which the information given by scientists got published in one or other newspaper every day. This has

Fig. 5. Technology videos uploaded in you tube

Fig. 6. Innovative diagnostic advisory sheet

created huge impact and the farmers used to get first hand information from newspaper and call the scientists to get their doubts clarified. In this way, the KVK, Thiruvarur reached the entire district. In order to exemplify the linkage of KVK Scientists with print media, the publications made in newspaper has been categorised into crop, animal husbandry, value addition, soil, Plant protection etc., and made into a bound volume of book entitled "Storehouse of Agricultural Information: Compilation of News items published by Scientists of KVK, Thiruvarur" and it was put in KVK website. This has become a readily available resource material for scientists, Extension workers and farmers. .(Fig.7) The second volume of such compilation has also been released recently.

Yet another important role of KVK is to sustain the relationship with farmers. The maintenance of good relationship with farmers will go a long way in diffusion of technologies to farmers. As discussed already, with the limited manpower in KVK, the scientists cannot reach nook and corner of the districts. One important innovative idea implemented by KVK, Thiruvarur is to bestow awards and recognition to selected 25 farmers every year in order to motivate them and also this will indirectly influence them to transfer the technologies to other farmers as "KVK Ambassadors"

2.1.9 Designing Exhibitions with Out of Box thinking

Exhibitions are the usual activity of KVK Scientists and the Extension scientists have often been entrusted with this task. Usual way of putting up charts would not interest the viewers. Hence, the Extension scientists in KVKs should improvise in arranging Exhibition. In KVK, Thiruvarur, instead of putting up a stall, the miniature rice field has been created in the threshing floor and various technologies like SRI method of cultivation, IPDM in rice, direct sowing of rice, water management technologies have been depicted which has attracted the visitors. Rather than showing in a chart or a model, this miniature fields have opened up a new way of designing Exhibitions (Fig. 8).

2.1.10 Participatory Training Evaluation to Rid of Mundane Evaluation

Training evaluation is an integral part of all trainings. This has become a mundane exercise and neither the scientist nor the trainee will be interested in evaluation. Hence, the scientists in KVK, Thiruvarur designed a participatory training evaluation. What we can do is to try collecting both qualitative and quantitative data to evaluate the effectiveness of any training.

One innovative idea is to display the materials related to the training and asked the participants to identify the displayed material before and after training- This qualitative analysis will aid the data collected through pre post training impact analysis. This was tried in a training on Composite fish culture where the fish species/ materials/inputs/medicines related to the training were displayed outside the training hall. The trainees were given with a paper and asked to identify the exhibits. The same paper was again given after the training was over and again they were allowed to see the exhibits. The change in learning was enumerated (Fig.9).

2.1.10 Extension Scientists Can Innovatively Publish and Prove in KVKs

Extension Scientists do a lot of work in KVK, but often they fail to publish. Basically, we do not have a conviction that the KVK work can be published. If we try to publish also, it used to be in low rated journals. This is because the of the fact, that our articles do not possess rigorous statistical analysis. There is ample scope for Extension Scientists to publish their work in quality journals than their counterpart in Research and Teaching. The following are the situations and statistical tools which could be used to publish the articles in high rated journals (Table 2).

2.1.11 Innovate in Mobilizing/Facilitating Farmers Groups/FPOs

The Extension Scientist can hone skill of building the capacity of FPO members, BODs and CEOs. In KVKs, the Extension Scientist’s important role is to facilitate FPOs in terms of capacity building, evolve business plan for them and to link them with formal and informal institutions. Extension Scientists should feel that it is our arena for which we had been prepared during our PG and Ph D studies in Group dynamics and Team building. Similarly, Extension Scientist in KVKs can transform KVK into a nodal Capacity Building Centre for FPOs and come up with a comprehensive Training Manual.

Fig. 7. Strengthening the bond with farmers and media personnel

Fig. 8. Designing exhibitions with out of box thinking

Fig. 9. Participatory training evaluation to rid of mundane evaluation

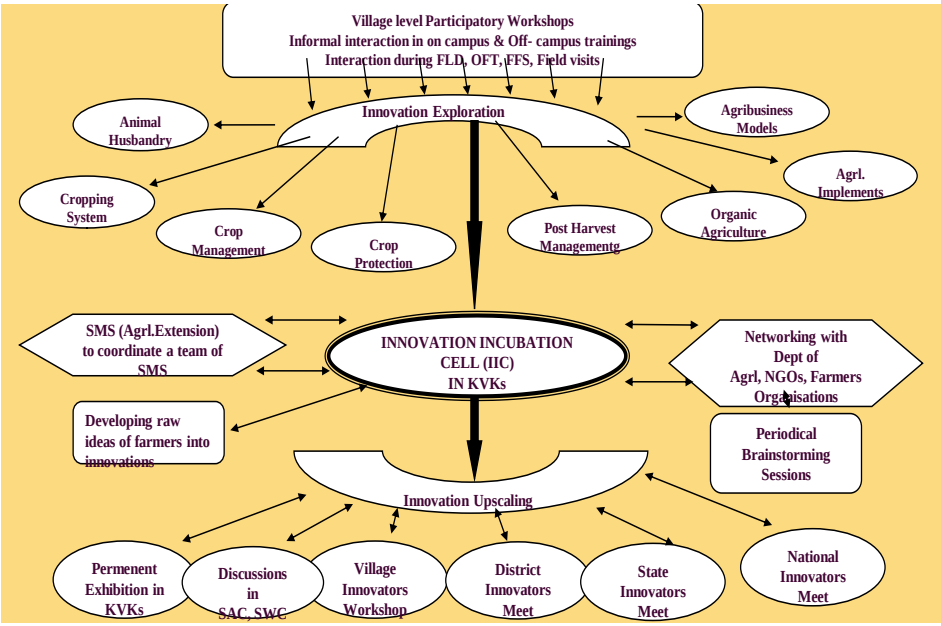


Fig. 10. Innovative Model for making use of Farmers Innovations

Table 2. Extension Scientists can Innovatively publish and Prove in KVKs

Nature of Data	Statistical tools
Comparative data between farmers from two villages, male/female, small/big farmer	Parametric –T test, ANOVA, Discriminant analysis
	Non parametric- Mann-Whitney U
Training Evaluation- before/after	Kruskal Wallice
Ranked data emanated from PRA tools	Kendall's Concordance
	Spearman rank correlation
If you are working with Farmers in a village more than three years and implementing a particular intervention	Repeated Measures ANOVA
Impact indicators	Factor analysis
Studying varietal attributes	Cluster analysis, Multidimentional scaling
Adoption	Bivariate and Multivariate logistic, probit regressions

The following are the innovative ways in which the Scientists of KVK, Thiruvarur facilitated FPOs

1. Thaaiman FPC was facilitated to come up with a business plan on Traditional rice trading.
2. Karikalan Pulse FPC was given guidance to erect a seed processing unit with the help of Govt.of Tamil Nadu.
3. Linking Karikalan FPC with Dept. of Agriculture and Dept.of Agrl. Engg to get mechineries related to Rice cultivation
4. During corona pandemic, Karikalan Pulse FPC was facilitated to come up with a marketing strategy of selling vegetables and due to this activity, this KVK has received Rs. 10 lakhs from State Government for best performing FPO.

2.12 Documenting Farmers Innovations with Zeal

The Extension scientists have a greater role in KVK to innovatively document farmers Innovations at grass root level. No other scientists can creatively document farmers innovations other than Extension scientists as they have been trained during their Post Graduation.

Mr. Elangovan in Manaparavai village of Thiruvarur District has come up with a innovation wherein he designed a drum seeder by modifying the existing one which suits the requirement of lands in Thiruvarur District. The farmer has modified the seed felling drums by fabricating and welding cooker vessels and made holes in such a way it uniformly fell in the ground. Further, he kept the drums in such a way that spacing for intercultural operations using

mechanical weeder could be possible. Besides, he has removed the corrugated wheel which may struck in the clay and modified it with a cycle tyre. Like this many Innovations have been documented.

While documenting this innovation, a idea was struck in our mind to establish a Innovation Incubation Cell, which the scientists in KVK, Thiruvarur have been trying to establish in coming years. There are three dimensions namely, Innovation Exploration, Innovation Incubation and Innovation upscaling are there in the proposed model which is given (Fig.10).

3. CONCLUSION

Krishi Vigyan Kendras are Wonderful Institutions where Extension Scientists can really implement practically whatever they learnt in their UG, PG and Ph.D courses. Union Government in coming years is all set to give enormous thrust to KVKs. This being the reality, Extension Scientists should occupy the KVKs and prove what we can do. There is enormous freedom in KVKs for the Extension Scientists to hone their skills and to innovate in their activities. The innovative small and big ideas which has been implemented in KVK, Thiruvarur by an Extension Scientist is very much possible in other KVKs also. Hence, this epitome of innovative activities in KVK, Thiruvarur is to set the stage for Extension Scientists to innovatively function in KVKs and hogs the limelight.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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