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Innovative and Interactive Approach for Productivity Enhancement: Farmer Field School (FFS) Concept in Mung bean in Arid Zone

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Abstract: Based on data from mung bean growers in the Pali area of Rajasthan, India, this paper addresses the concept of Farmer Field School (FFS), its function for sustainable agriculture in the semi-arid zone, and its impact on production. When compared to farmers' current practices, the grain yield improved dramatically with the remedies supplied in demonstrations under FFS. The adoption rate was boosted by fine-tuning the production technology depending on the individual conditions in each region and the resources available to the farmers. The differences in technological gaps in various fields suggested that recommended varieties performed better with different interventions and that recommended technologies were more feasible during the study with other criteria such as farmer monitoring, soil type, and field fertility status. Similarly, the technology index for all demonstrations in the study was in accordance with the technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology. Economic yield as a function of grain yield and sale price was also taken into consideration. The results indicate higher additional returns and effective yields under FFS demonstrations.

Key words: Mung bean, Farmer Field School, arid zone, grain yield, interventions, additional return, technology gap, demonstrations.

After it was apparent that most technologies created by researchers alone were inadequate for smallholder farmers in the late 1980s, participatory extension initiatives arose (Jurgen *et al.,* 2000). Farmers participate in the design, management conditions, and implementation and evaluation of experiments in participatory extension. Agricultural technology development and transfer (TDT) has generally relied on a vertical one-way communication model, with information moving from research to extension, with extension's duty being to disseminate the information to farmers. The problem definition in many of these linear models tended to favor research interests over farmer perceptions of problems. Farmers' hesitation to adopt new technologies was explained by practitioners as a result of the technology's inadequacy. The solution was to improve the process by emphasising farmer participation.

The farmer field school (FFS) approach is a good example of participatory extension, vertical and horizontal spread of the FFS extension approach of educating farmers is impressive. FFS now has a presence in at least 78 nations, spanning from Asia to South Africa, Latin America, East Europe, and the United States (Braun *et al.,* 2006). They are a participatory method of learning, technology development, and dissemination (FAO, 2001) based on adult learning principles such as experiential learning (Davis and Place, 2003). The first FFS was designed and managed by the Food and Agriculture Organization (FAO) of the United Nations in Indonesia in 1989 to train the trainers and farmers on Rice-Integrated Pest Management (IPM) technology in a participatory mode (Matata *et al.,* 2010). FFSs were conceptualized between 1970s and 1980s and first implemented in Indonesia in 1989 (Pontius *et al.,* 2002). Rola *et al.* (2002) and Mwagi *et al.* (2003) reported that farmers who had received FFS training performed better in a test of knowledge than farmers who had not received FFS training. The FFS is a nonformal training programme for selected farmers within a locality, usually a village. FFS thus have a social goal beyond mere changes in pest management techniques that seek to promote the empowerment of farmers by building human and social capital (Gallagher, 2000). During the past two decades, FFSs have been held for many crops including cotton, tea, coffee, cacao, pepper, vegetables, small grains and legumes (Pontius *et al.,* 2002). Waves of adaptation in FFSs have occurred from a focus

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on a single constraint (pest management) of a single crop (rice) to an emphasis on the multiple dimensions of crop management to cropping systems to resource management to socio-cultural dimensions of community life. This may be seen as the natural progression of the FFS; the phasing or timing by which particular FFSs would evolve to multi-dimensional and/ or higher-level concern is for the groups itself to determine (CIP-UPWARD, 2003). The FFS model has been extended to several other topics such as livestock production, forestry, nutrition and health (HIV prevention) (Tripp *et al.,* 2005). In total, thirty developing countries in the world are currently experimenting with and implementing the FFS approach (Van den Berg, 2004). According to Feder *et al.* (2004), FFS trained farmers knew more about IPM than non-FFS farmers, but that knowledge was not isn't transferred to farmers in villages with FFS who didn't attend the programme. Extension services usually have a variety of other responsibilities, such as consulting farmers on input availability and agricultural loan sources. Because technology transfer is traditionally viewed as a one-way procedure, this strategy has been dubbed "sock-it-to-them" (Rolling, 1996). Methodologies in participatory extension are designed to aid in the research-extension-farmer continuum in a learning process where each group learns from the others. Farming Systems Research (FSR) and the Training and Visit (T&V) extension system are examples of efforts to increase Agricultural Knowledge and Information Systems (AKIS) synergy (Rolling, 1996). As a result, there is a strong need to promote participatory multidisciplinary research that prioritises farmer empowerment.

Keeping these points in view, a study was undertaken to study the concept of FFS taking mung bean as the major crop enterprise.

Material and Methods

Concept of FFS

The Farmer Field School Extension Model FFS are platforms and "schools without walls" for improving decision-making capacity of farming communities and stimulating local innovation for sustainable agriculture (Braun and Graham, 2000). FFS offers community-based, non-formal education to groups of 20-25 farmers through self-discovery and participatory learning principles. The learning process is based on agro ecological principles covering a cropping cycle. The school brings together farmers who live in the same village/catchment and, thus, share the same ecological setting and socioeconomic and political situation. FFS provides opportunities for learning-by-doing. Extension workers, subject matter specialists or trained farmers facilitate the learning process, encouraging farmers to discover key agro ecological concepts practiced in the field. During the learning, all the stakeholders participate on an equal basis in field observations, discussions and in applying their previous experiences and new information from outside the community to reach management decisions on the appropriate action to take for increased production. The FFS model is an example of group-based experiential learning (or "learning by-doing") that encourages farmers in "informal schools" to meet once a week in the same farmer's field and analyse and discuss their farming operations and then determine which agricultural interventions should be adopted and evaluated on their own farms. Normally, 20 to 30 neighboring farmers gather for group study on a member's farm once a week for about 14 weeks in a typical growing season. The overall objectives of FFS are to bring farmers together to carry out collective and collaborative inquiry with the purpose of initiating community action and solving community problems (Oduori, 2002). The facilitator assists the group in using actual real-life events rather than imagined experiences in FFS group meetings, practical exercises and trial plots. All of these activities follow Kolb's learning cycle (Kolb, 1984), in which farmers use factual observations to reflect on their experiences and then conceptualise the learning points on which actions are based.

Selection of site for FFS

Sites selected for the conduction of FFS were central point for other participants in the FFS for easy access. As the cooperation of the lead farmer was the key to success of the FFS, some activities were planned well in advance of the scheduled day for FFS. Similarly, the use of some of the inputs like seed treatment, application of herbicides and micronutrients assists the opportunity to demonstrate some of the situations like disease symptoms, appearance of weeds and symptoms of micronutrient deficiency, which are otherwise important for hands-on activities and knowledge for the farmers. Therefore, a small plot of about 500 square meters or so adjoining the demonstration plot (site of FFS) was established where such situations will develop and can be used for observation as well as hands-on activities.

Selection of farmers for FFS

The farmers participating in each FFS were selected by the KVK, Pali and District Agriculture Officer in consultation with village Panchayats and Zilla Parishads. Some elderly and respected people who are already awarded/recognized in the area for progressive agriculture were selected for FFS. Farmers selected for FFS were within contiguous area in a village or neighboring villages. The selection of farmers was done well in advance so that other modalities/arrangements for the conduct of FFS were made in consultation with the farmers on whose field FFS was to be conducted. The knowledge of specific assistance being provided to the farmer for the conduct of field demonstration is essential so that the facilitator knows what other inputs and arrangements are to be made for the conduct of this school throughout the season. The members of the FFS visited these demonstrations regularly as and when possible and took note of the salient features/activities of these demonstrations. Farmers were divided into homogeneous groups of convenient size.

Arrangements for the conduct of FFS

Arrangements for the conduct of these schools, such as soil testing, provision of inputs, equipments and implements; participation of experts from the SAU/KVK/ICAR institutes and other organisations; stationary and other training materials such as posters, charts, and manuals, other preparations like multiplication of structured questionnaire and the arrangements for tea and snacks during the conduct of these schools were made by the facilitator beforehand. A tentative list of field visits/demonstrations, inviting some progressive farmers to deliver a talk on their success stories were also arranged well in advance.

Facilitator and technical experts

FFS facilitators come from a wide variety of domains including extension workers, NGO workers, farmer organization staff or previously trained farmers. They introduce new ideas through guided exercises and stimulate discussion "by farmers, for farmers", without dominating the scene. Their role is to encourage active exploration and understanding of how farming systems work. Facilitators go through rigorous, season-long training conducted by "master trainers" and follow the same "learning-by-doing" approach as the farmers they will eventually train in FFS. The facilitators and master trainers ensure linkages with district and national-level resources, helping to improve the flows of information and knowledge sharing. Besides the technical knowledge and skills, the facilitator must be able to manage the group-building process and strengthen and support the education process in the FFS. Facilitating FFS is a complex job that requires a wide range of competences. They should know the community and its members, speak a similar language, be recognized by members as colleagues and know the area well (Gallagher, 2006). A facilitator creates a conducive environment for farmers to learn by arranging opportunities for them to observe, analyse and interpret situations. In the current program, the main sources of facilitator and technical experts were from the State Department of Agriculture (SDA), State Agricultural Universities, (SAU), KVK, Pali and ICAR Institutes etc. However, SDA and KVK were the main actors. Before the start of field activities, farmers were asked to make some discussion on structured questions and present the outcomes. This whole exercise of structured discussion and presentation was completed within one hour so that there was ample time for hands-on activities and other field observations. Farmers were divided in 4-5 groups of convenient size to have some structured discussion on a topic. The facilitator compiled and supplemented the outcomes of various groups. Facilitator used this information in finalising the gap analysis exercise to be undertaken in FFS.

Crop selection and interventions taken

Mung bean was selected as the crop to be grown under FFS as it is one of the important major kharif crops in Rajasthan. Average national productivity of this crop is remaining very less due to low level of awareness among the farming community about area specific recommended package of practices. Precision farming, introduction of high yielding varieties tolerant to diseases and pest can do the wonders in the growing area. The present study was carried out by the KVK, Pali under ATMA scheme of DOA during rabi season of 2018-20 on the farmers' fields of selected five villages viz., Kharda, Dholeria, Sari Ki Dhani, Rampura and Inderwada of Pali district with following objectives.

1. To exhibit the performance of high yielding mung bean variety in Pali district with scientific interventions.
2. To compare the yield levels of FFS fields and local cultivar with farmer's practice.
3. Economic analysis and its comparison of scientific interventions through demonstration and farmers' practice.

Each demonstration under FFS was of 0.5 ha in area. Improved variety of mung bean was tested through Front Line Demonstrations (FLDs) with the following interventions (Table 1) and compared with local variety grown with farmer's practices.

In demonstration plots, a few critical inputs in the form of quality seed, balanced fertilizers, agro-chemicals were provided and non-monetary inputs like timely sowing in lines and timely weeding, irrigation and other inter cultural operations were also performed, whereas traditional practices were maintained in case of farmers' practice. The seed was treated with Trichoderma viridae (10 g kg^{-1} seed) and Bavistin (2 g kg^{-1} seed) in a closed container and then shade dried for some time before sowing. Trichoderma also applied as soil application @ 2.5 kg ha^{-1} mixed with 1.25 Qt. FYM to control the root-rot disease. Line sowing was performed with the help of multi seed cum fertilizer drill developed by CIAE, Bhopal. Phosphorous was supplied through DAP (46% P_2O_5) before sowing at the time of field preparation. Growing of locally available variety of mung bean without seed treatment and application of only 25 kg ha^{-1} nitrogen at 60-70 days after sowing with irregular/ indiscriminate use of pesticides and fungicides is the farmer's practice prevailing in the area. The sowing was done during the second week of July. The front-line demonstrations were conducted to study the gaps between the potential and demonstration yield, extension gap and technology index. Data with respect to yield and output for FFS plots and on local practices commonly adopted by the farmers of the area under study were recorded and analysed. The details of different parameters are as under:

Extension Gap = Demonstration Yield (DY) – Farmers' Practice Yield (FPY)

Technology Gap = Potential Yield (PY) – Demonstration Yield (DY)

Technology Index = (PY-DY/PY) × 100

Additional Cost = Demonstration Total Cost – Farmers' Practice Total Cost

Effective Gain = Additional Return – Additional Cost

Table 1. Details of existing farmers' practices and scientific interventions for mung bean cultivation

Intervention	Farmers' practice	Scientific proven technology demonstrated
Seed and seed rate	Locally available seed, recommended seed rate	IPM 02-3 (resistant to mung bean yellow mosaic virus) Seed rate: 15-20 kg ha^{-1}
Sowing method	Mostly broadcasting	Line sowing by tractor operated seed cum fertilizer drill (R x P= 30 x 10 cm)
Sowing time	Second rains of monsoon	first week of July with onset of rains
Seed treatment	No seed treatment	Seed treatment by Bavistin (2 g kg^{-1} seed) and Imidacloprid 600 FS @ 5 ml kg^{-1} seed, followed by Trichoderma viride (10 g kg^{-1} seed), Rhizobium and PSB culture @ 5-7g kg^{-1} seed
Weed management	Hand weeding	Spray of weedicide Imizathapar @ 50 gm ha^{-1} at 18-20 DAS and thereafter hand weeding performed at 35-40 DAS
Fertilizer application	Irregular use of fertilizers and fertilizer application is mostly through DAP @ 80 kg ha^{-1}	FYM: 5 ton per hectare 15:40:0 kg NPK ha^{-1}, full dose of DAP and half dose of N applied at sowing, remaining N applied in standing crop
Plant protection measures	Irregular use of chemicals MP dust (15 kg ha^{-1})	Foliar spray of Quinalphos 25 EC @ 1 L ha^{-1} and Imidacloprid 17.8 SL @ 150 ml ha^{-1} for the control of pod borers and sucking insects, respectively.

Additional Return = Demonstration Return – Farmers' Practice Return

Net Returns = Total (Gross) Returns – Total Cost of Production

Incremental B:C Ratio = Additional Return / Additional Cost

Five FFS were selected randomly for the study and a total of 250 respondents were selected from the five villages, out of which, 125 respondents were participants and 125 were non-participants. To know the impact of farmer field schools on knowledge level of cultivation practices 25 participants and 25 non-participants from each FFS from each village were selected randomly. The present study was concentrated on cultivation practices of mung bean. Ex-post facto research design was employed for conducting the study. Data were collected by using a detailed pretested interview schedule and PRA technique was employed wherever necessary. The information regarding knowledge about production technologies were gathered, scored, quantified, categorised, tabulated and interpreted using standard statistical methods.

FFS curriculum activities to be undertaken during the learning period

The FFS was based on a solid tested curriculum, which covers the entire crop cycle. The field guides, study fields plus a collection of group dynamic exercises provided the basis for the field school curriculum. These materials were used according to their appropriateness. Training in the farmer field school is experiential and discovery based. The training activities were designed to have participants learn by doing. Most of the training time was spent in the field. The exchange of information and the generation of knowledge were facilitated through sharing observations, brainstorming and long discussions. A cornerstone of the FFS methodology is agro-ecosystems analysis (AESA) which is the establishment by observation of the interaction between a crop and other biotic and abiotic factors co-existing in the field. This involves regular (usually weekly) observations of the crop. Participants work in sub groups of 4 or 5, and learn how to make and record detailed observations including: growth stage of the crop, insect pest and beneficial insects, weeds, disease levels, weather conditions, soil condition and overall plant health. The farmers then take management decisions based on these observations.

Results and Discussion

Growth and yield attributes

The results presented in Table 2 indicated that maximum plant height (60.2 cm) was recorded in the mung bean demonstration plot at Kalali village, which also recorded the maximum number of pods per plant (27.4), whereas in the control plot the values were 55.6 cm for plant height in Kalali and 21.3 pods per plant in Aratia respectively. The values for seeds per pod ranged from 8.45 (Kalali) to 7.57 (Rampura village) in demonstration plot and at farmers field it varied from 7.21 (Dhoaria) to 6.45 (Aratia). In demonstration plots, 100 seed weight values were 4.01 at Aratia (highest) and 3.88 at Rampura (lowest), whereas it ranged from 3.68 (Aratia) to 3.55 (Dholeria and Kalali) at farmers' field.

Grain yield: The grain yield improved significantly with the interventions given in demonstrations under FFS as compared to farmers' existing practices. Maximum yield of 1063 kg ha^{-1} under FFS was recorded in the

Table 2. Growth and yield attributes influenced by technological interventions on mung bean at farmers' field (3 years mean)

Village name	Plant height (cm)		Pods/plant		Seeds/pod		100 seed weight (g)	
	Demo	FP	Demo	FP	Demo	FP	Demo	FP
Sari ki Dhani	55.8	52.7	25.4	20.6	7.71	6.54	3.98	3.62
Dholaria	56.4	52.5	26.2	19.7	8.24	7.21	3.91	3.55
Aratia	57.3	54.2	25.8	21.3	8.02	6.45	4.01	3.68
Kalali	60.2	55.6	27.4	20.5	8.45	6.83	3.95	3.55
Rampura	54.5	51.1	24.5	20.1	7.57	6.52	3.88	3.59
Overall average	56.8	53.2	25.9	20.4	8.00	6.71	3.95	3.60

Demo. = Demonstration, FP = Farmers' practice.

Kalali village, which was higher (22.3%) than the yield (869 kg ha^{-1}) obtained under farmers' practice. While minimum yield (930 kg ha^{-1}) under FFS was recorded in the Rampura village which was highest (24.30%) than the yield (748 kg ha^{-1}) obtained under farmer practice. On the basis of the above study, it is inferred that an overall yield advantage of 22.5% over farmers' practices was recorded with the average yield of 1005 kg ha^{-1} under FFS demonstrations carried out with improved cultivation practices (Table 3). The reason for low yield by farmers practice is sowing at improper time followed by non-availability of quality seeds, sowing by broadcasting, use of inadequate and imbalanced fertilizers and plant protection measures. The results clearly prove the foundation of FFS "farmers first" philosophy, which is in direct contrast to the transfer of technology approach. "Farmers first" concept is essential to empower farmers to learn, experimentation and technology generation and decision making (Paredes, 2001). The results on gain in yield are also in accordance with the findings of Singh *et al.* (2019), Bhargav *et al.* (2015), Raj *et al.* (2013), Dubey *et al.* (2010) and Yadav *et al.* (2004).

Gap analysis

Data presented in Table 3 revealed that an extension gap was found from 217 kg ha^{-1} (Dholeria village) to 137 kg ha^{-1} (Aratia village) and on average basis it was 185 kg ha^{-1}. This emphasized the need to educate the farmers through innovative methods for adoption of improved technology especially high yielding varieties sown with the help of seed cum fertilizer drill with balanced nutrition, sowing time, irrigation method and appropriate plant protection measures in demonstrations which resulted in higher grain yield than the traditional farmers' practices. These results are in agreement with the findings of Singh *et al.* (2011) in cumin and Tetarwal and Singh (2021) in groundnut crop. The investigation further exhibited a wide technology gap among different fields. It was lowest (187 kg ha^{-1}) in Kalali village and highest (320 kg ha^{-1}) in Rampura. The average technology gap of all the fields was 245 kg ha^{-1}. The difference in technology gap in different fields is due to better performance of recommended varieties with different interventions and more feasibility of recommended technologies during the course of study with other factors like monitoring by farmers, soil type and fertility status of the fields. Similarly, the technology index for all demonstrations in the study was in accordance with the technology gap. Higher technology index reflected the inadequate proven technology for transferring to farmers and insufficient extension services for transfer of technology. In this study, overall 19.6 per cent technology index was recorded, which varied from 15% (Kalali Village) to 25.6% (Rampura Village). FFS as a participatory extension methodology recognizes the need to involve farmers in technology development and transfer. In this process, farmers are central in the process of technology development. FFS training emphasizes building on the farmers' ability to experiment and draw conclusions and it empowers farmers to improve their socio-economic conditions (Asiabaka and James, 1999). These promising technologies were validated and disseminated through Farmer Field School (FFS) approach only. Field schools and other successful programs had the common characteristics of group interaction among farmers, regular meetings, discovery-based-learning in the field and regular follow up encounters with individual farmers leading to higher adoption by the farmers (Paredes, 2001).

Table 3. Grain yield and gap analysis of technological interventions on mung bean at farmers' field (3 years mean)

Village	Area (ha)	Potential yield (kg ha^{-1})	Demo yield (kg ha^{-1})	FP yield (kg ha^{-1})	Yield increase over FP (%)	Ext gap (kg ha^{-1})	Tech gap (kg ha^{-1})	Tech index (%)
Sari ki Dhani	0.5	1250	1023	829	23.4	194	227	18.2
Dholaria	0.5	1250	1048	831	26.1	217	202	16.2
Aratia	0.5	1250	962	825	16.6	137	288	23.0
Kalali	0.5	1250	1063	869	22.3	194	187	15.0
Rampura	0.5	1250	930	748	24.3	182	320	25.6
Overall average	0.5	1250	1005	820	22.5	185	245	19.6

Demo. = Demonstration, FP = Farmers' practice, Ext. = Extension, Tech.= Technology.

Table 4. Economic analysis of technological interventions on cumin at farmers' field (3 years mean)

Village	Total cost (Rs. ha^{-1})		Additional cost in demo (Rs. ha^{-1})	Total returns (Rs. ha^{-1})		Additional returns in demo. (Rs. ha^{-1})	Effective gain (Rs. ha^{-1}) INC	IBCR
	Demo	FP		Demo	FP			
Sari ki Dhani	18150	15750	2400	61380	49740	11640	9240	4.85
Dholaria	17300	15050	2250	62880	49860	13020	10770	5.79
Aratia	17550	16200	1350	57720	49500	8220	6870	6.09
Kalali	18300	16050	2250	63780	52140	11640	9390	5.17
Rampura	17200	15150	2050	55800	44880	10920	8870	5.33
Overall average	17700	15640	2060	60312	49224	11088	9028	5.38

Demo = Demonstration, INC = Incremental, FP = Farmers' practice.

Economic analysis

Different variables like seed, fertilizers and pesticides were considered as cash inputs for the demonstrations under FFS as well as farmers' practices. Data of economic analysis presented in Table 4 exhibited that on overall average basis, an amount of Rs. 17,700 ha^{-1} was incurred under FFS demonstrations and Rs. 15,640 ha^{-1} under farmers' practice (FP).

An average additional amount of Rs. 2060 ha^{-1} was incurred under demonstrations than FP. Economic yield as a function of grain yield and sale price were also taken into consideration. Maximum additional returns (Rs. 13,020 ha^{-1}) were obtained in FFS demonstration field at Dholeria village due to higher grain yield and the overall average additional returns of Rs. 11,088 ha^{-1} was obtained under the FFS demonstration fields. The higher additional returns and effective yield obtained under FFS demonstrations could be due to improved variety, scientific proven technology, non-monetary factors, timely operations of crop cultivation and scientific monitoring. Through farmer field schools, farmers learn about, and investigate for themselves, the costs and benefits of alternative management practices for sustaining and enhancing farm productivity (Gallagher, 2006). The lowest and highest incremental benefit: cost ratio (IBCR) was 4.85 and 6.09 in the Sari Ki Dhani and Aratia FFS, respectively depending on grain yield produced. Overall average effective gain is Rs. 9028 ha^{-1} and IBCR is 5.38. The results of the study confirm the findings of Tetarwal and Singh (2021) on groundnut; Singh *at al.* (2019) on pulses; Lathwal (2010) on black gram; Dayanand *et al.* (2012) on mustard; Meena and Singh (2011) and Yadav *et al.* (2004) on cumin. The results confirm the expected outputs of FFS approach of increased farmers' capacity for research, innovation and informed decision-making subsequently increase in farmers income as reported by Ashby *et al.* (2000).

Conclusions

The average yield of the FFS demonstration plots using improved varieties and scientific technologies was higher than that obtained under farmers' practises. FFS is based on the premise that participating farmers become researchers who test various technological options available, during which process they are able to decide what the best alternative for adoption is in their particular circumstance. As a result, FFS was a very effective tool in changing attitude, skill, and knowledge by using improved varieties and recommended package of mung bean cultivation practises. It is a participatory strategy to disseminate and fine-tune production technologies in order to achieve a high adoption rate. Fine-tuning of the production technology based on the location specific conditions and resources available with the farmers enhances the adoption rate. The field school offers farmers an opportunity to learn by doing, by being involved in experimentation, discussion and decision-making. This strengthens the role of farmers in the research-extension-farmer chain. It also improves the sense of ownership of technological packages and new knowledge and skills. The FFS approach is a direct response to the needs of the farmers. Unlike other extension tools, FFS is a two-way communication system between farmers and a facilitator, who could be an extension or research worker. If correctly implemented, FFS improves farmer-to-farmer technology and knowledge transfer. When agricultural research stakeholders are involved in the planning and implementation, they have a sense of belonging and ownership. The farmer will be at the centre of agricultural research and dissemination of mung bean production methods if the FFS extension approach is used. This method not only helps with issue resolution, but it also helps to make research more relevant to the needs of farmers and other users. To conclude, the FFS model is a significant institutional and organisational innovation that requires further investigation in various agro-ecological zones, institutional configurations, and across time. Farmer Field School as a model is the most appropriate methodology for validation and dissemination of agricultural technologies which can lead to people-oriented and sustainable agriculture in developing nations.

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