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ABSTRACTS

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Effectiveness of Farmer to Farmers Extension model for enhancing technology uptake in pulses

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Diffusion of agricultural technologies is though initiated by public extension services, it takes it own course once farmers realizes its potential through local experimentation and adaptation. The informal and unstructured diffusion of proven agricultural technologies takes off and results in its transfer to other farmers in the social interactions with farmers who initially accepted and tried them. Farmer to Farmer Extension (FFE) model is a farmer centric, low cost approach for effective dissemination of agricultural technologies in the farming communities. The approach is being widely practiced in many countries in Latin America, Asia, and Africa in different forms. At the base of this approach are the farmers who are wither selected or appointed, paid or otherwise, for facilitating the technology diffusion among a specified region. These farmers initially work in close interaction with the experts; develop capacities in experimentation and sharing of the acquired knowledge with other farmers in their social networks. Wide varieties of terms are used by researchers across the world for these community leaders. They are called lead farmers (Tsafack *et al.*, 2015),key farmers (Sah et al, 2014), *kamayog* in Peru (Hellin and Dixon 2008), farmer promoters in Bangladesh (Islam *et al*., 2011),farmer teachers in western Kenya (Amudavi et al., 2009), community extension workers in Uganda (Ssemakula and Mutimba 2011) and VFTs in Malawi and Kenya (Kiptot *et al* .,2016). The entire approach works on empowering the farmers' leaders to be the change agents. Identification of this type of farmer to work with extensionist to increase technology diffusion among farmers (Sinja et al 2004) is important.

The approach could play complementary role to formal extension services in facilitating the dissemination of agricultural technologies and improving farmers' capacities.

Effectiveness of FFE model

Empirical studies have found the informal farmers to farmer seed exchange mechanism to be effective for dissemination of quality seeds of important crops in various geographies in the world. This informal dissemination method was found vital in technology transfer to farmers, especially for seed varieties and improved livestock (Cromwell, 1990). In the same line, Ndjeunga et al 2000, Hassan *et al* 2008, Sahetal 2018 also found that farmers to farmers seed exchange is an effective means of diffusing new varieties to farmers especially among the small farmers that formal seed systems were unable to cover. These informal seed diffusion can be in terms of exchange or barter of seeds, gifts, payment of labour, sale as seed etc. This system not only makes the seeds available to the farmers but also provided them seeds at a relatively lesser cost. (Hassan et al 2008).

Farmer to farmer extension of agricultural technology including improved seeds offer alternative approach for a better reach among the farming community. Farmer to farmer extension approach was found to be effective in area expansion under introduced quality seed of pulses in 1: 8.1 ratios against the initial area. Among the introduced quality seed of pulse crops, the highest seed diffusion ratio was observed with respect to quality seed of pigeon pea (26.3) followed by summer mungbean (12.7. (Sah 2017). Farmer-to-Farmer extension approach of seed dissemination was found to be effective in completing the formal seed diffusion mechanisms in addressing the issues of shortage of improved seeds as well as limitation of extension machinery to carry out transfer of seeds of improved pulse varieties to the farmers. (Sah *et al* 2018).

FFE model in Indian Context

The current extension system in India is decentralised; plurastic and demand drive with structural arrangements for effective transfer agricultural technologies to the farmers. However, the usage data of these services reflect a different perspective. Data collected by National Sample Survey organization 2003, revealed that as high as 60 % of the farmers sampled had not accessed to any source of information on modern technology last year. For the 40 % who accessed the information sources, progressive farmers and input dealers were a primary information source.

Only 5.7 per cent of farmers had received information from public extension agents. Further, only 4.8 % of small farmers and 12.4 % of large farmers accessed the public extension services. Wide extension personnel and farmer ratio 1:1500 (Agarwal, 2011) with limited financial resources for operation and capacity development (Sulaiman *et al* 2005; Swanson, 2006) explains the poor access percentage of extension services in India.

Farmer led extension approaches have emerged to be important mechanisms for dissemination of agricultural technologies within a vast expanse at a reasonable cost within a limited time frame. Farmer-to-Farmer Extension (FFE) approach is one such approach for informal technology diffusion through farmers' social network in rural settings (Sah*etal*2014). FFE approach attempts to harness the indigenous leadership exiting in the farming community and their social networks for the achieving the goals of agricultural development. Integration of FFE approach for wider acceptability of technologies has been witnessed in India in form of Farmer field school as well as use of farm facilitators with the name kisanmitra/krishakmitra/Krishalsahyogi as a link between extension system and farmers at village level.

Effectiveness of FFE model for dissemination of quality seed of pulses: Evidences from Bundelkhand region of India

An action research project on Farmer to farmer extension implemented by ICAR-Indian Institute of Pulses Research, Kanpur during 2010-14 in six project villages of Bundelkhand region of India with the objective to assess the effectiveness of farmer to farmer extension for dissemination of improved pulse production technologies among the farming community.

Pulse growers who were interested to partner the experimentation under the project were identified and were called as Key farmers. Seeds of high yielding varieties of chickpea, lentil and field pea were introduced in the project villages through the selected key farmers (143 no) who disseminated double the quantity of seed they received after the harvest in the subsequent crop season to two other farmers in their social network. Before providing quality seeds, the selected key farmers were given training on appropriate crop production and protection technologies.

A total of 2535 kg seed of major pulse crops i.e., chickpea (variety: JG-16, DCP 92-3, KGD 1168 and Ujjawal), lentil (Variety: DPL 62) and field pea (variety: IPFD 1-10) was infused in the seed system and about 86 acres of area was brought under the project interventions. The decision of key farmers to transfer the improved varieties as per the commitment or not as well as the extent of transfer was hypothesized to be dependent on farmers socio-psychological, economic and similar other characteristics like farmers' perception of the technology.

Finding revealed that from 2535 kg of quality seeds that was provided to 143 key farmers, Farmer to farmer diffusion was found to be effective in diffusing about 7480 kg of produce as seeds among 331 farmers that covered 301 acres of area. Thus farmer to farmer networks were found to cause 3.7, 4.4 and 2.7 times enhancement in quantity of seed diffused, the area covered under the introduced varieties and farmers reached. In addition, the extent of acceptance of structured mechanism of farmer to farmer extension among key farmers was analyzed and it was revealed that farmers' response to structured diffusion in ratio of 1:2 varied with the pulse crops and majority of the farmers preferred structured diffusion in ratio of 1:1 rather than 1:2.

Logit model was used to analyze the factors associated with farmers' decision to follow the structured diffusion of improved pulse varieties. Study revealed that majority of the farmers preferred 1:1 ratio for structured diffusion. The structured diffusion varied significantly, with respect to years and pulse crops. Variables like educational level, social participation, yield advantage accrued, attitude level and training exposure significantly determined the decision of farmer to follow the structured diffusion of quality seed of pulse crops.

The influence of socio- personal, psychological and economic factors on farmers' decision on extent of diffusion was quantified using Tobit analysis. The statistical model was used to assess the relationship between the extent of diffusion (structure and unstructured) of seeds of introduced pulse varieties as carried out by the key farmer and the various factors affecting i.e., socio-personal, psychological and economic factors. Variables like extent of information utilization, land under crop, perception towards improved pulse varieties, attitude towards improved technologies and yield advantage positively and significantly ($p<0.01$) influenced farmers' decision; whereas operational land holding size and income from the crop were found to negatively and significantly influenced farmers' decision on extent of seed diffusion.

The results reflect on the potential of farmer to farmer diffusion of improved seed of pulse varieties that could be suitably harnessed by structuring the diffusion for bringing additional area under improved seed and achieving higher per unit productivity.

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