Field Experience Training: Pragmatic Multidisciplinary Approach for Developing Comprehensive Village Development Action Plan

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ABSTRACT

India is primarily an agrarian society. Indian villages and villagers largely depend on agriculture for livelihoods. The progress of agrarian society is crucial for sustainable development of the countries like India. Advances in agricultural research and development are the key to attain this. In this realm, proper identification and prioritization of farming-related and farmer-related problems is crucial for developing interventions in participatory mode. There are multiple approaches and methods for participatory problem identification and analysis. One such reliable and widely adopted approach is Participatory Rural Appraisal (PRA). In this context, Field Experience Training (FET) is an opportunity for newly recruited agricultural scientists to explore the field-level real agricultural problems. A study carried out by a multidisciplinary team of newly recruited scientists under expert guidance using PRA methodology revealed the existing problems in the villages including severe ground water depletion, existence of problematic soil, in-effective utilisation of existing village and farm resources, crop and animal production and marketing issues faced by farming community. Based on assessment of existing situation the multidisciplinary team developed comprehensive village development action plan to provide a unique database and blueprint for local developmental departments and researchers to act on existing problems for betterment of farming communities and thereby village development.

Key words: *Field experience training; Village development action plan; Multidisciplinary approach; PRA;*

The future of India lies in its villages" said Mahatma Gandhi, the father of nation. India is predominantly agriculture dominant and dependent country having 6.4 lakh villages (*Census of India, 2011*) and a home for 893 million rural populations, largest in the world (*United Nations, 2018*), of which majority are depending on agriculture for their livelihood. But, Increase in the agrarian distress (*Vasavi, 1999; Deshpande, 2002; Vyas, 2004; Posani, 2009*) and decrease in the number of agricultural cultivators (*Gupta, 2016*), about 8.5 million from last 2001-2011 census (*Directorate of Economics & Statistics, 2017*) is an evidence for reflection of poor performance of agriculture sector in providing better livelihood to rural sector. Considering all this trade-offs, the village development with focus on agriculture sector at grass root level is a crucial step for prosperity of farming communities. There are many methodologies adopted by researchers and developmental agencies in this realm, among which, Participatory Rural Appraisal (PRA) (*Mascarenhas et al., 1991; Chambers, 1994b*) is one such major evolution. The key strength of PRA is that it enables researchers to take local problems and priorities into consideration while formulating any research by understanding their local complexity (*Gijsbers et al, 2001*) through participation. Thus PRA facilitates the

development of research plans that are linked to the overall development requirements of rural localities (*Henman and Chambers, 2001*).

Therefore, keeping PRA as a major problem identification tool, Field Experiential Training (FET) was modulated by NAARM. The concept of the module serves as a 'social laboratory' to apply the knowledge and skills under 'real-life' situation to promote interaction and analyse the stakeholders socio-economic and agro-ecological systems to integrate and build up need-based action proposals to address the identified and prioritized researchable issues (*Sontakki et. al., 2002 and NAARM, 2015*). Based on this concept a comprehensive village development action plan was worked out by multidisciplinary team of scientists under Field Experience Training (FET).

The designing of the village development action plan in the present paper is based on the concept of "bricolage". The concept described in several literatures as "the best use of resource available in hand" (*Louridas, 1999; Baker, Nelson, 2011; Debnath and Bardhan, 2018*). *Debnath and Bardhan, (2018)* describes resource bricolage as an active developmental tool to solve burning problems existing in the village. Therefore, the formulated village development action plan (VDAP) will provide guidelines for the local organisations to act on identified issues for the overall development of the village.

METHODOLOGY

Field Experience Training (FET) is to provide an opportunity to the scientist trainees to focus research efforts on field realities and needs of stakeholders by employing participatory rural appraisal methodology (*NAARM, 2015*). A multidisciplinary team of six scientists were constituted and posted in the, Krishi Vigyan Kendra (KVK), Kalaburagi, identified as FET centre by the expert group from the NAARM. With the help of experts of FET centre, Melkunda (B) village in Kalaburagi district of Karnataka (India) was selected for field experience training study. A series of activities were carried out in the selected village to gather diverse information required for preparation of village development action plan through PRA.

Participatory analysis of village : Participatory Rural Appraisal (*Mascarenhas et al., 1991; Chambers, 1994b*) was carried out in the identified village with active involvement of villagers under the facilitation of multidisciplinary team of scientist trainees during months of February-March, 2018. Selected PRA tools were employed to elucidate both qualitative and quantitative information and data on a range of topics including village baseline survey, GPS based village boundary identification; transect walk, resource mapping, agro-ecosystem analysis, timeline, trend analyses, participatory problem identification and prioritization and preparation of VDAP. In addition, 40 randomly selected households of the village were surveyed and census data on village demographics were collected through local Gram Panchayath office and official government websites.

Problem identification and prioritization : After a detailed analysis of PRA tools and formal discussion with the farmers a 10 most important problems were listed and forty farmer households were surveyed for its prioritisation using Rank Based Quotient (RBQ) and Value Based Index (VBI) method, calculations were done using following formulas.

$$RBQ = \sum_{i=1}^{n} \frac{fi\,(n+1-i)}{N \times n} \times 100$$

Where,

f_i = Frequency of farmers for the i^{th} rank of the problem

N = Number of farmers contacted

n = Maximum number of ranks given for ranking problems.

i = Rank of the problem

Value based index is calculated using the formula:

VBI = RBQ x Total economic loss % per annum

Information and data validation: After detailed PRA approach, a village focus group discussion (village seminar) was carried out for cross validation (triangulation) of obtained information on identified agricultural problems with farmers and other stakeholders in the village. After village focus group discussion a team of trainee scientists presented results in FET centre for discussion with experts from various ICAR institutes and other KVK Subject Matter Specialists and valuable suggestions received were incorporated in final VDAP.

RESULTS AND DISCUSSION

Basic information and Agricultural Resource Scenario of study area : The village Melkunda (B) is

Table 1 Basic information and agricultural resource scenario of the village

Particulars	Details
Demographic pattern	
Total Population	2117 (100)
Male	1074 (50.73)
Female	1043 (49.27)
Families pattern	
Total household	800 (100)
Nuclear family	146 (18.25)
Joint family	654 (81.75)
Land holding classification	
Marginal farmers (<2 ha.)	67 (13.34)
Small farmers (2-5 ha.)	172 (34.26)
Medium farmers (5-10 ha.)	148 (29.48)
Large farmers (>10 ha.)	115 (22.9)
Total farmers	502 (100)
Geographical Area (in ha)	
Total geographical area	1652 (100)
Total cultivated area	1525 (92.31)
Total Un-irrigated area	1323 (86.76)
Total irrigated area	202 (13.24)
Forest area	25 (1.5)
Other land	102 (6.1)
Water Resources	
Seasonal pond	01
Bore wells	76 (functional)
Major crops and Cropping season	
Kharif: Pigeon pea, cotton, maize, sorghum	
Rabi: Chickpea, vegetables	
Major crops: Pigeon pea, cotton, sorghum, mulberry	
Minor crops: wheat, bottle gourd, maize, water melon	
Livestock details	
Cow (local breed)	22
Buffalo	231
Sheep	77
Goat	638
Veterinary hospital	1

Figures in parenthesis indicate per centage

Source: Rural Development & Pachayat Raj Department, Govt. of Karnataka, 2018

situated 22 km from KVK, Kalaburagi district of Karnataka state, India. The village total population is about 2117 out of which about 1074 (50.73%) are male and 1043 (49.27%) are female. The village has a total of 502 farm families in which, 115 (22.9%) are large, 148 (29.48%) are medium and 172 (34.26%) and 67 (13.34%) are belongs to small and marginal farmers respectively (Table 1). Village has total geographical area of about 1652 ha having total cultivated land 92.31 per cent (1525 ha) included irrigated area of 202 ha (13.24%) and un-irrigated cultivated are of 1323 (86.76%). The major soil type is black and clayey loam. The black soil types observed were stony in most parts of the village. Pond, open well and bore well are the major water resources in the village, about 76 bore wells are functional and approximately 700 are dried, due to over exploitation of ground water. The major crops grown in the village are Red gram, Bt-cotton, sunflower, sorghum, wheat and mulberry. Besides, the farmers are also engaged in sericulture as one of the remunerative occupation in the village. The minor crops include horticultural crops like water melon, banana and vegetables like tomato, carrot, onion and cash crop sugarcane. Livestock serves as an important subsidiary source of livelihood for all classes of farmers. Livestock population includes 22 cow, 231 buffalo, 77 sheep and 638 goat population with one veterinary dispensary.

Participatory resource mapping of the village **:** A series of PRA activities were conducted for analysis of situation in the village including social map, resource map, agro-ecosystem analysis, technology map, time line and trend analysis and mobility map to understand the existing situation of the village to prepare village development action plan.

Transect walk : As a part of PRA exercise, village transect was carried out along with key informants. The main objective of the transect is to understand and study the major land uses, topographical pattern, water resources, crops, weeds, pest and diseases, natural vegetation, livestock, existing problems and potential opportunities in the village by observing, interacting and discussing with the key informants, while walking in the decided direction.

Agro-ecosystem analysis: The Melkunda (B) village is located between latitude $17^0$19.895 N and Longitude $76^0$39.650 E (Ref point: Siddeshwara temple), with an elevation of 1519 m above MSL. The average rainfall is 750 mm and relative humidity is around 30-40 per cent with mean annual minimum and maximum temperature is about 20°C and 48°C respectively as shown in Table 1. The above mentioned factors promote dry agro climatic condition in the region (semi-arid). Further, detailed information were gathered about macro and micro ecological features and different systems related to agriculture. The soil is black and loamy deficient in iron in some patches. The cultivable land is

divided in two regions, upland and lowland. In lowland most of the area covered under black cotton soil with high surface gravel and erosion problem, due to slightly undulated topography. It is rich in flora and fauna, with existence of village water tank (watershed) and community grazing lands. The pond is the major source of water for drinking and bathing of livestock animals in the village and it helps to recharge the groundwater of the village. The major cropping system includes red gram, cotton and vegetables. While in upland side the land is almost plain and exist loamy soil, comparatively low gravel content. But, the area is affected with ground water depletion and lack of water storage structures due to its high elevation. Therefore most of the upland area is rainfed and few lands are irrigated from borewell sources. Major cropping system includes pigeon pea and existence of mulberry crop in selected areas. The residential area is divided and distributed in both upland and lowland and considerable human interactions exist among agro-eco system to derive food and fodder.

Bio-resource flow: A detailed bio-resource flow was prepared based on the available resources in the village to identify inflow and outflow of farm produce and its by-products from and to the household (*Palsaniya et al, 2009*) for its effective utilisation. The focus was to explore the interrelationship between different farm enterprises and their resource recycling in effective manner. A representative household, a medium sized farmer was selected to identify the resource flow. The existing resource flow was drawn, indicating continuous lines for existing interventions and dotted lines for proposed intervention flows as shown in the fig.4. The Bio-resource flow of the village suggest several interventions in the village including adoption of bio-gas for effective utilisation of animal dung, use of Neem tree seeds for preparation of NSKE (Neem Seed Kernel Extract) and vermin-composting unit.

Technology map : Technology map was drawn to know the adoption behaviour of the farmers towards various technologies in the farming. The detailed information on adoption, discontinuance, rejection and over adoption of farm technologies were documented and their reasons are elucidated (Table 2). The major outcome of this technology map includes active rejection of improved cross breed animals due to its lack of guidance on rearing practices. Further, discontinuance of several crops, farm equipments also elucidated. It also observed that farmers are adopting new technologies and crops

Table 2. Adoption behaviour of the farmers towards various farming technologies

Category	Technology	Adoption	Reason(s)
Crop	Bt Cotton	Adopted	Pest resistance and high yield
	Maize	Discontinued	Pig Problem and lower yield
	Water Mellon	Adopted	Higher price and better market
	Coconut	Active Rejected	High Disorder (e.g. Trunk Splitting)
	Pigeon pea	Adopted	Lower cultivation cost, higher yield, good market availability
	Ground Nut	Discontinue	Lower yield and wild borer problem
Cow	Cross breed cows	Active Rejected	Low temperature tolerance and higher maintenance
	Jawari	Adopted	Environment friendly and low maintenance cost
Machinery and Tool	Drip Irrigation	Adopted	To overcome scarcity of water problem and provision for govt. subsidy
	Red gram nipping tool	Adopted	Time and labour saving tool, as well as low cost tool
	Rotator	Adopted	Energy efficient equipment and time saving
	Mulching	Adopted	Soil and water conservation, reduce weed infestation, decrease cost of cultivation
	Country plough	Discontinue	Time consuming, available of tractor drawn plough
	Tractor	Adopted	Time saving and multi-purpose machine
	Reversible plough	Adopted	Eliminating back and dad furrow as well as time and fuel saving equipment
Irrigation Source	Bore well	Over Adoption	To irrigate high water consuming crops and vegetables, poor water conservation and recharge measures

were observed. Overall the village is receptive to adopt new technologies.

Problem identification and prioritization: Ten most important problems faced by the farmers were identified and using rank based quotient, extent of damage due to problem and value of economic loss. The most important problems identified and prioritized were ground water depletion followed by high cost of cultivation, adaptation problem of high yielding cross breed cows, pod borer infestation in red gram, marketing of red gram and silkworm (Table 3). The cause of ground water depletion was over adoption of bore wells and surface irrigation of water to high water demanding crops like water melon, sugarcane and other vegetables. Further, problem of high cost of cultivation caused by the factors like high cost of pesticides and labour wage during peak period of farm operations. Farmers perceived problem of poor adaptation of high milk yielding cross breed cows, it may due to extreme hot climate, cross breed cows frequently prone to diseases, and high maintenance cost and lack of knowledge on rearing of cross breed cows discourage them to non-adoption of cross breed animals. Farmers also encountered problem in marketing of silk cocoons and red gram. A detailed survey revealed that there are two market options available for the villagers; Kalaburagi and Ramanagara cocoon market located 20 and 650 km respectively. Interestingly most of the farmers prefer to go for long distance Ramanagara cocoon market than Kalaburagi, reasons were the on-spot sale and payment for their silk cocoon in Ramanagara market. But, in nearby Kalaburagi cocoon market delay in payment, controlled bidding due to few buyers and low price are the key factors to motivate farmers to rely on long distance Ramanagara market for marketing of cocoon. Further discussion revealed that lack of procurement of red gram crop, due to market glut in the peak season affects the price of red gram. Meanwhile, problems like pod borer infestation problem in pigeon pea crop, high weed infestation in crops, unavailability of labour, low level of mechanization etc. as depicted in Table 3.

Village development action plan: A comprehensive village development action plan was prepared after a month-long participatory exercise. The results were analysed and maps were drawn in participation with Melkunda (B) villagers. Then important problems were discussed by multidisciplinary scientist team in the village focus group discussion (Village seminar) in collaboration with farmers and subject matter experts KVK, Kalaburagi. The detailed action plan includes what is the identified problem, why problem is persisting, to whom the problem is concerned, how to tackle or solve the problem and what are the expected outcome from the solution. The major implications elucidate that there is a need for immediate focus on ground water recharge through adoption of on-farm water conservation techniques, demonstration and training on advanced dairy practices for the farmers to overcome poor adoption of high milk yielding cows. Meanwhile promotion of effective recycling of animal dung for bio-gas and vermicompost production, formulation of breeding programme for the improvement of local milch breeds

Table 3. Problems identification and prioritization

Problems	Individual Ranks										RBQ	% Loss /Annum	VBQ	Rank
	1	2	3	4	5	6	7	8	9	10				
Ground water depletion	3	5	4	22	4	0	0	0	0	2	59.69	50	2984.5	I
High cost of cultivation	4	29	3	1	0	0	2	0	1	0	71.14	40	2845.6	II
Adaptation problem of high yielding cross breed cows	5	3	1	0	5	18	2	4	1	1	47.42	60	2845.2	III
Red gram pod borer infestation	2	4	2	3	21	0	0	1	0	7	47.63	30	1428.9	IV
Marketing of silkworm cocoon and red gram crop	4	2	25	0	3	0	2	0	0	4	59.90	20	1198	V
High weed infestation in crop	1	3	2	1	0	10	17	3	1	2	39.72	30	1191.6	VI
Unavailability of labour	30	5	1	2	1	0	1	0	0	0	78.41	10	784.1	VII
Low level of mechanization	1	2	0	2	0	2	10	15	3	5	30.78	25	769.5	VIII
Extension information	1	0	0	1	4	2	3	4	10	15	22.88	20	457.6	IX
Digital illiteracy	1	0	4	0	2		3	10	13	7	26.83	15	402.45	X

and adoption of dryland horticulture for better income and crop diversification. To tackle marketing issues, need to bring both APMC and cocoon market in Kalaburagi under e-NAM platform to create competition, demand and high price to the farmers produce were also recommended.

CONCLUSION

To understand the dynamics of agriculture under current scenario, multidisciplinary approach is crucial for the development of agrarian economy like India. To tackle different problems of agricultural research village development action plan was prepared by multidisciplinary team of scientist with participation of all the stakeholders. Therefore, this field experience training is unique module serve village as a social laboratory for effective problem identification under actual field situation for further research and development. Further development of village development action plan using bricolage concept, will guide the local organizations to focus on developmental issues for betterment of agriculture in the village.

REFERENCES

Census of India (2011). Provisional Population Totals, Rural-Urban Distribution. Page. No.1http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/paper2_at_a_glance.pdf Accessed on: 01-10-2018.

Chambers, R. (1994a). The origins and practice of participatory rural appraisal. *World Devel.*, **22**(7), 953-969.

Conway, G. (1985). Agroecosystem analysis. *Agril.Administration*, **20** : 31-55.

Debnath, R., &Bardhan, R. (2018). Resource Symbiosis Model through bricolage: A livelihood generation assessment of an Indian village. *J. of Rural Studies*, **60** : 105-121.

Deshpande, R. S. (2002). Suicide by farmers in Karnataka: Agrarian distress and possible alleviatory steps. *Eco. and Pol. Weekly*, 2601-2610.

Directorate of Economics & Statistics, (2017). Pocket Book of Agricultural Statistics 2017, Government of India, Ministry of Agriculture & Farmers Welfare Department of Agriculture, Cooperation & Farmers Welfare, Directorate of Economics & Statistics, New Delhi. PP. 14. http://eands.dacnet.nic.in/PDF/Agricultural_Statistics_2017.pdf Accessed on 01-10-2018

Gijsbers, G.; Janssen, W.; Odame, H. H. & Meijerink, G. (2001). Planning agricultural research: a source book. CABI Publishing.

Gupta, N. (2016). Decline of cultivators and growth of agricultural labourers in India from 2001 to 2011. *Intl.J.of Rural Mngt.*, **12**(2), 179–198. https://doi.org/10.1177/0973005216665939

Mascarenhas, J.; Shah, P.; Joseph, S.; Jayakaran, R.; Devavaram, J.; Ramachandran, V.; Fernandez, A.; Chambers, R. and Pretty, J. (1991). Participatory rural appraisal: proceedings of the February 1991 Bangalore PRA trainers workshop. In *RRA notes*. IIED and MYRADA, Bangalore.

NAARM (2015)**.** Field Experience Training (FET) guidelines, National Academy of Agicultural Research Management, Hyderabad. https://naarm.org.in/wp-content/uploads/2016/07/FETGuidelines-Jan-2016.pdf Accessed on: 02-01-2018

Palsaniya, D. R.; Singh, R.; Yadav, R. S.; Tewari, R. K.; Dwivedi, R. P.; Kumar, R. V. and Yadav, S. P. S. (2009). Participatory agro-ecosystem analysis and identification of problems. *Indian J. of Agro forestry*, **11**(1) : 91-98.

Posani, B. (2009). Farmer suicides and the political economy of agrarian distress in India. Development Studies Institute, Working Paper Series, (09-95).

Rao, V.M., (2009). Policy making in India for rural development: The contextual limits to quantitative approaches, IGIDR. Indira Gandhi Institute of Development Research, Bangalore, India (http://www.igidr.ac.in/pdf/publication/PP-062-07. Pdf.)

Sontakki, Bharat S.; Sandhya Shenoy, N.; Soam, S. K. and Rao, V. K. J. (2002). Participatory rural appraisal. In: Silver Jubilee Souvenir. NAARM, Hyderabad, pp 106-110.

United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition. https://population.un.org/wup/Country-Profiles/ Accessed on: 01-10-2018.

Vanessa, Henman and Chambers, Robert (2001). Participatory rural appraisal, Chapter 26. Gijsbers et al. (Ed) Planning Agricultural research: A Sourcebook, CABI Publishing. pp.291-299).

Vasavi, A. R. (1999). Agrarian distress in Bidar: Market, state and suicides. *Eco.and Pol.Weekly*, 2263-2268.

Vyas, V. S. (2004). Agrarian distress: Strategies to protect vulnerable sections. *Eco.and Pol.Weekly*, 5576-5582.

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