Village Agricultural Development Action Plan Through Participatory Rural Appraisal Techniques: A Case Study of Santa Village, Morena, Madhya Pradesh, India

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ABSTRACT

Participatory Rural Appraisal (PRA) approach has been extensively employed by researcher/development practitioners to enable effective interaction and planning with communities. The rapid acceptance of Participatory Rural Appraisal (PRA) approaches to facilitate the understanding of problems among rural people, and the acknowledged priority for such studies to be sensitive to local conditions, has sometimes meant that such approaches have overlooked opportunities for appropriate application of relevant techniques. PRA and its forebears have for some time incorporated quantification or classification techniques such as matrix ordering or ranking (with considerable success), but with only limited incorporation of more complex analytical tools. This case study conducted by the multidisciplinary team members during the Field Experience Training (FET) attempts to focus upon the application of PRA techniques to investigate, analyse and evaluate constraints and opportunities and to formulate research plan to address the problems. The complexities of problem involved in agriculture can be understood through PRA and hence, it is a system approach for systematic and rapid collection of information. The Santa village has very rich tradition in cattle farming. There is huge scope for the adoption of improved breeds of cow, cattle with high milk production capacity. Development of nutrient enriched feed for cattle had a great opportunity to make the crop and animal production, a much profitable venture. With this there is huge scope in orchard establishment for horticultural crops like pomegranate, custard apple, etc.

Keywords: Participatory rural appraisal, Techniques, Morena, Field experience training

INTRODUCTION

Currently, India holds the second largest agriculture land (179.9 million hectares) in the world. The journey of Indian agriculture system is glorifying since the inception of planning commission in 1951. We faced nightmare of absolute shortage of food grain supplies in the 1960s. At the time of independence, the first Prime Minister Shri Jawaharlal Nehru said, *"everything else can wait, but not agriculture."* There have been several policy statements for agriculture during the last sixty years. Thanks to the Green Revolution, India attained self-sufficiency in food grains in the 1970s and emerged as an exporter of food grains to other countries. Presently, India ranks second worldwide in farm output. Agriculture sector accounts 13.7% of the GDP. The contribution of agriculture and allied sector to the GDP has fallen from 61 to 13.7% in the last 60 years (Tripathi and Prasad, 2009).

Due to increasing demand of land for housing, rising level of urbanization and industrialization, fertile agricultural land is being shifted to non-agricultural uses. India's food, nutritional, livelihood and economic

security continues to be predicated upon the growth of agriculture sector and the situation will remain the same in the near future also. Now, nearly 72 per cent of our population live in rural areas where poverty is predominant phenomenon. Approximately 60 per cent them are engaged in agriculture for their livelihood either directly or indirectly. Increased productivity in agricultural sector helps in poverty alleviation, employment generation and increase the nation's economic growth. The productivity and growth of India's agriculture is in decelerating pace now owing to many reasons such as reduction in soil fertility, excessive use of fertilizers and imbalance of nutrient content in the soil, problems related to biomass availability, genetic erosion, water logging and salinization, depletion of groundwater table, imbalances in nutrient availability because of changes in cropping patterns and contamination of water bodies and soil by pesticides and fertilizers.

Participatory rural appraisal (PRA) has been defined as "*family of participatory approaches and methods which emphasize local knowledge and enable local people to do their own appraisal, analysis and planning. PRA uses group animation and exercises to facilitate information sharing, analysis and action among stakeholders*" (David *et al.*, 2002). To improve the agricultural scenario, the need based, less time consuming, location specific problem identification and solution is very important. Participatory Rural Appraisal (PRA) tool makes the farmer themselves as a solution agent and also provides the accurate information about the study area. PRA helps the farmer to identify their own livelihood issues and helps the trainee scientists to understand the problems of the farmer from farmers. PRA is an exercise that deals with temporal and spatial issues in agricultural activities. Spatial information supplies the database about soil type, water resources, land use, land pattern and topography of different life support system. Temporal data helps in seasonal analysis, adoption and awareness about the new technologies and human dimension helps in knowing the facts about participation, gender issues, disaggregation, cultural values and ethics of the people of that locality.

MATERIALS AND METHODS

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, 2020). A multidisciplinary team of six scientists were constituted and posted in the, Zonal Agricultural Research Station, Morena, RVSKVV, Madhya Pradesh, identified as FET centre by the expert group from the ICAR- National Academy of Agricultural Research Management (ICAR-NAARM). With the help of experts of FET centre, Santa village of Joura Tehsil in Morena District, Madhya Pradesh, India was selected for FET 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.

The Participatory Rural Appraisal (Mascarenhas et al., 1991; Chambers,1994b) is a research technique developed in early 1980s as an alternative and complement to conventional sample survey. PRA is a way of learning from and with farmers to investigate, analyse and evaluate constraints and opportunities and to formulate research plan to address the problems. In the present study, PRA tools and techniques were used in the identified village with active involvement of villagers under the facilitation of multidisciplinary team of scientist trainees during the period of February-March, 2020. The selected PRA tools and techniques were employed to collect the information of the selected village and problems related to farming from villagers by conducting various activities like, survey and transect walk, mappings, group meetings, village assembly, problem priority chart seasonal calendars, trend and change analysis, and preparation of VDAP. The village social workers with panchayat secretary conducted the PRA study of 18 days in the said village. In addition, 40 randomly selected households of the village were surveyed and census data on village demographics were collected through local Gram Panchayat office and official government websites.

After detailed analysis of PRA tools and formal discussion with the farmers, ten most important problems were listed and forty farm households were surveyed for its prioritisation using Rank Based Quotient (RBQ) and Value Based Index (VBI) method.

After detailed PRA study, 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 village development action plan (VDAP).

RESULTS AND DISCUSSION

The village total population is about 2640 out of which about 1479 (56.02%) are male and 1161 (43.97%) are female. The village has a total of 314 farm families in which, 44 (14%) are large, 157 (50%) are medium, 98 (31.21%) are small and 15 (4.77%) are landless agricultural farmers and main occupation of villagers is farming. Basic information of the study village shown in Table1.The major crops grown in the village are Bajra, Guar, Arhar in Kharif season and Wheat, Mustard, Potato in Rabi Season. The livestock of the village serves as an important source of income for all classes of the family. Buffalo is a major livestock in the village with average 2-3 buffalo in every household.

The main motive of this PRA activity was to understand and study the major land uses, topographical pattern, water resources, crops, natural vegetation, livestock and different ecological zones by observing, interacting and discussing with the key informants, while walking in the decided direction. The discussion included topics like land use pattern, land slope, soil type, soil fertility status, water recourses, agro-ecological zones, crops, weeds, trees and lives stock. During the transect walk in the village it has been observed that farming is practised with all the modern equipment and implements like tractor, seed drill, disk plough, subsoiler, power tiller, grader, knapsack sprayer, rotavator, milking machine, thrasher, cultivator and power sprayer. The availability of water for agriculture is sufficient and major source is tube wells. The livestock population of the village consists of cows, goats, buffalos, poultry birds and bullocks.

Different PRA activities were conducted for analysis of situation in the village and accordingly social map, resource map, agro-ecosystem analysis, technology map, time line and trend analysis, health map and mobility map were prepared with help of villagers to

Table 1: Basic resource information of Santa village of Madhya Pradesh

Particulars Details	Details
Demographic pattern	
Total Population	2640
Male	1479 (56.0%)
Female	1161 (43.97%)
Families pattern	
Total household	314
Nuclear family	45 (14.33%)
Joint family	269 (85.66%)
Land holding classification	
Large farmers (>10 ha.)	44 (14.0.%)
Medium farmers (5-10 ha.)	157 (50.0%)
Small farmers (< 5 ha.)	98 (31.21%)
Landless farmers	15 (4.77%)
Total farmers	314 (100%)
Geographical Area (in ha)	
Total geographical area	343.07
Total cultivated area	317.75
Total irrigated area	303.75
Water Resources	
Seasonal pond	2
Bore wells 76 (functional)	112
Major crops and Cropping season	
Kharif: Bajra (main crop), Guar and Arhar, Sorghum	
Rabi: Wheat (main crop), Mustard, Potato, Berseem (Fodder crop)	
Livestock details	
Buffalo (Murrah, Niliravi and Local)	980
Cow (Holstein Friesian, Gir, Sahiwal and Marwari and local breed)	185
Goat (Jamnapari)	12
Poultry (Kadaknath)	23

understand the existing situation of the village to prepare village development action plan.

The climatic and environmental condition with relation to the agricultural practices were represented in the agro ecological map. It also depicts the subsystem and component of the agroecological system. It helps in better understanding of the interaction between the agriculture and the environment around agriculture. Agro-ecological resource map of the village Santa was

drawn to identify the various agro ecological condition present in the village. The farmers (Key informants) were encouraged to draw the agro ecological map themselves marking the important landmarks. Special emphasis was given to mark the various topographical areas, cropping systems and crops, soil types, water bodies, weeds, water sources and irrigation system, livestock, trees and other aspects related to agro ecology as shown in Figure 1. The study village *Santa* village basically has a crop-based cropping system. Most of the farmers are cultivating the crops like Wheat, Mustard, Potato, Bajra, Guar. Complete cultivation is done in irrigated area with sandy loam soil type. The

normal annual rainfall is 753.7 mm and relative humidity is around 40-55 percent with mean annual minimum and maximum temperature is about 31°C and 43°C respectively. The residential area of the village mainly consisted of houses and all the livestock *i.e.* cattle, present in this area. The soil is sandy loam. Two ponds are available Main water source of water is bore wells (all time) also supply water for various purposes. Trees like Mango, Bael, Wood apple, Teak, Babul, and Eucalyptus are present in some parts of the residential area. Neem trees are available in large number in the residential areas also. Commonly available weeds in this village are Bathua (*Chenopodium album*), Mama Ghass
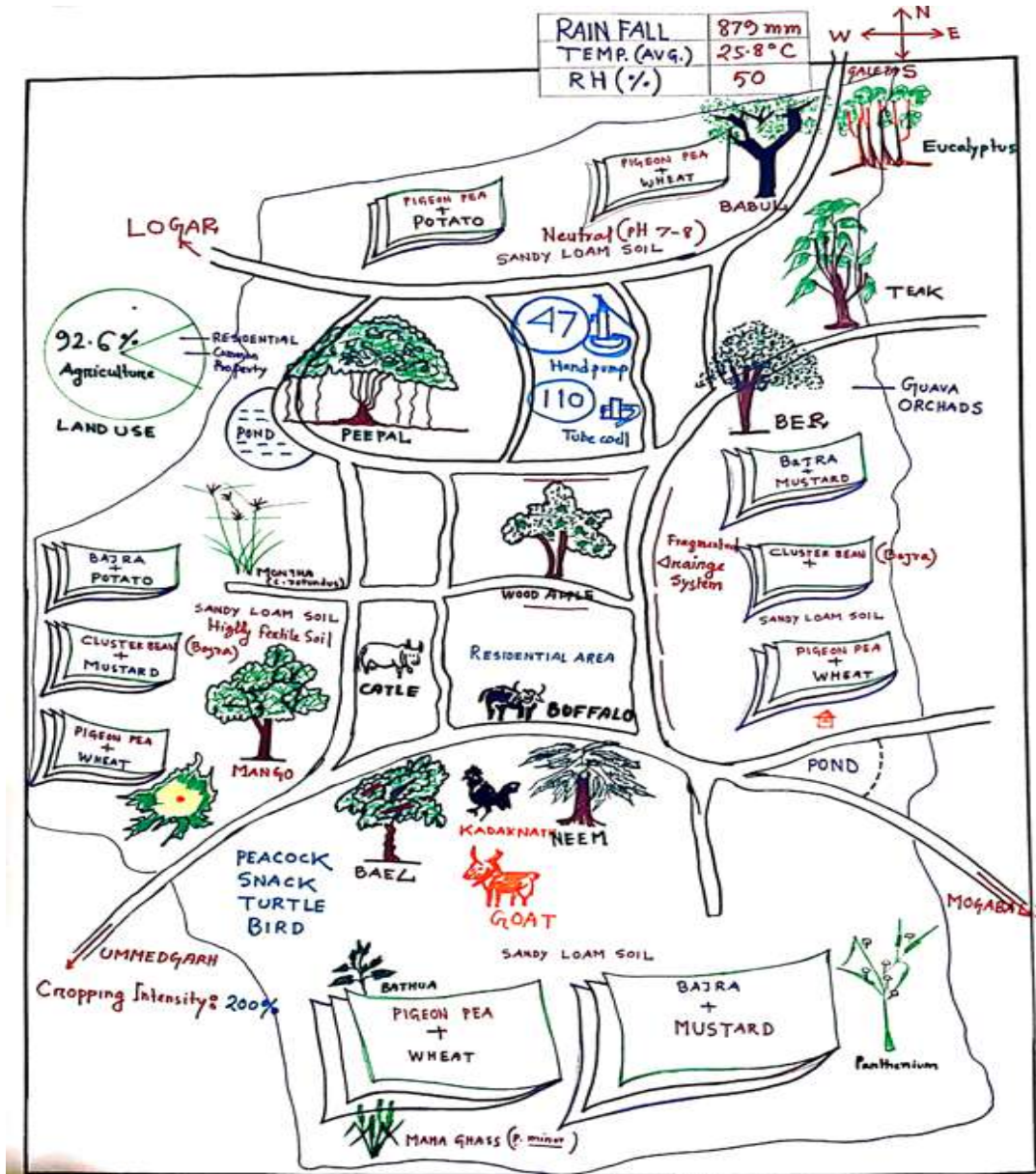

Figure 2: Agro-ecology map of Santa village of Madhya Pradesh

(*Phalaris minor*), Congress grass (*Parthenium hysterophorus*), Montha (*Cyperus rotundus*) and *Argemone mexicana.*

Seasonal calendar depicts month wise agricultural activities followed in a year. The main activities, followed in the study village *Santa* were identified by using seasonal calendar. It depicted time-to-time crop related operations being carried out in the village to maximize utilization of agricultural land across seasons. The common crop seasons in the village were *Kharif* and *Rabi*. Bajra, Guar, Arhar were the major crops of the village during *Kharif* season. Wheat, mustard and potato are the major crops grown during rabi season. In summer season there are no significant crop cultivation happens in this village. Livestock sector also had continuous activities. Animals were feeding in the home.

The technology map providing details related to decision behaviour of the farmers towards technology in terms of adoption, over adoption, reinvention, rejection and discontinuance with reference to the agricultural farm implements and structures, crops, vegetables, live stocks. The detailed information on adoption, discontinuance, rejection and over adoption of farm technologies were presented and their reasons are elucidated (Figure 2, Table 3). The major outcome of this technology map includes passive rejection of improved cross breed poultry due to dominance of religious values. Further, discontinuance of several crops also elucidated. It also observed that farmers are adopting new technologies and crops were observed. Overall, the village is receptive to adopt new technologies.

This is an analytical technique of exploring behaviours, decisions and coping strategies of households with different socio-economic backgrounds because study about socio-economic status of different scale farmers is helpful for designing and implementing government development programs (Pandey and Upadhayay, 2012). The livelihood analysis is drawn from each categories of farm family. The livelihood analysis of Santa village indicates that agriculture and allied is the major source of income for large, medium and small class families. The small and to some extent, the medium class depends on employment in agriculture and other labor work. Since maximum income comes from agriculture, majority of the expenditure are used for the same. Majority of the farm equipment's and livestock present in the village belongs to the farmer placed in the large and medium category.

Participatory Rural Appraisal (PRA) is the most helpful, desirable and advisable method to identify prevailing problems of farmer communities of the village. The problems faced by the farmers in either agriculture or livestock production were identified by participatory approach. For this purpose, forty (40) farmers were approached from the village representing all the sections (including small, marginal and rich famers) of the village using snowball technique. One by one all 40 farmers were asked to rank the problems based upon the severity and percentage of loss they are personally facing by the problem (the date collected from top 30 progressive farmers took for consideration to calculate Rank Based Quotient (RBQ) and Value Based Index (VBI)). Farmers were hinted about 9 major problems in different crops/ livestock sectors and given the ranks (ranking from 1 to 10) for each problem. Highest the VBI tells the severity of the

Table 2: Gender disaggregated seasonal calendar for major crops

Crop	Jan	Feb	Mar	April	May	Jun	July	Aug	Sep	Oct	Nov	Dec
Wheat	I(M)	I, PP, FE(M)	I, PP (M)	H (M+F)							LP	S,I, FE(M)
Potato	I, PP (M)	I(M)	H(M)							LP, Tr, FE(M)		I(M)
Bajra						LP(M)	S(M)		H(M)	I(M)	PP(M)	H(M+F)
Mustard			H(M+F)							LP, S(M)		I, FE(M)
Pigeon Pea							LP, S(M)	PP, (M)	FE (M)		H(M+F)	
Guar							LP, S(M)	PP(M)		H(M+F)		

(*Note:* LP-land preparation, N- Nursery, S-Sowing, Tr- Transplanting, FE- Fertilizer Application, I-Irrigation, PP-plant protection, H-Harvesting, M-Male, F-Female)
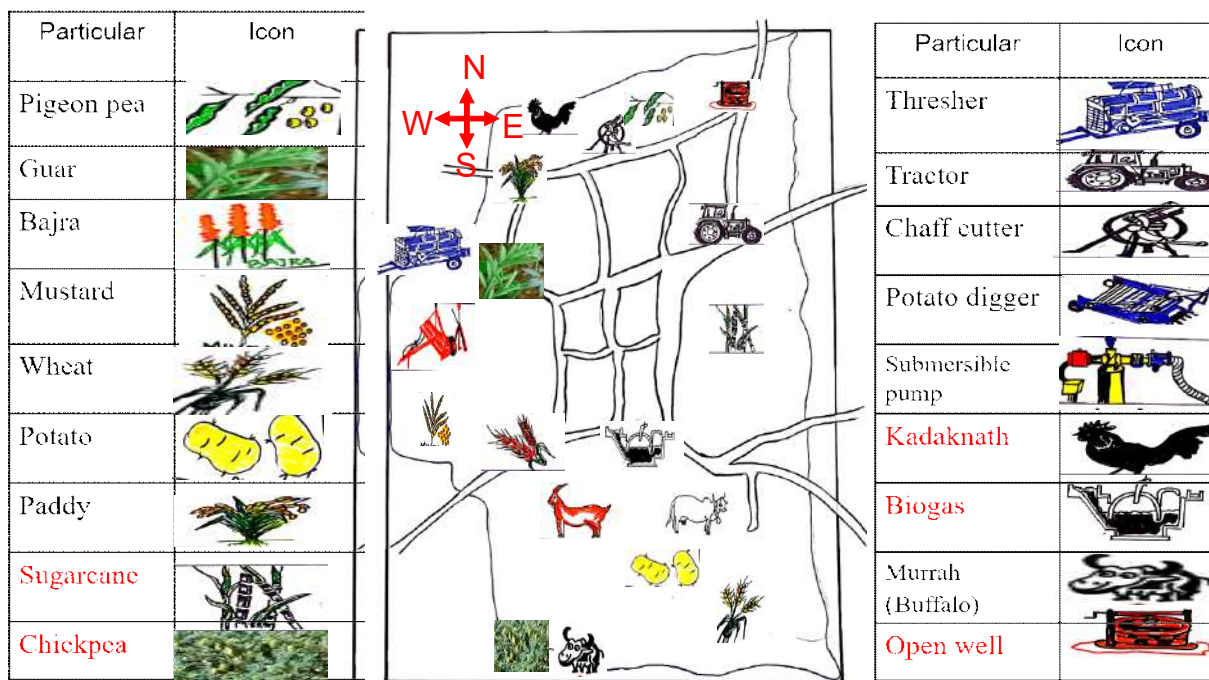
Particular	Icon
Pigeon pea	
Guar	
Bajra	
Mustard	
Wheat	
Potato	
Paddy	
Sugarcane	
Chickpea	

Particular	Icon
Thresher	
Tractor	
Chaff cutter	
Potato digger	
Submersible pump	
Kadaknath	
Biogas	
Murrah (Buffalo)	
Open well	

Figure 2: Agro-technology map of the study village

Table 3: Adoption behaviour of the farmers towards various farming technologies

Category	Technology	Status	Reasons
Machinery and implement	Country plough	Discontinued	Due to introduction of new technology
	Tractor	Adopted	Labour and time saving
	Knapsack sprayer	Adopted	Reduction due to introduction of power sprayer
	Power sprayer	Adopted	Reduction in drudgery
	Potato digger	Adopted	Time efficient
	Potato transplanter	Adopted	Timeliness in operation and saving of time
	Tractor	Adopted	Labour and time saving
	Knapsack sprayer	Adopted	Reduction due to introduction of power sprayer
	Thresher	Adopted	Shortage of labour, Time efficient
	Combine harvester	Adopted	Shortage of labour
	Laser land leveller	Recently adopted	Introduction of advanced technology
Irrigation Source	Tube well	Over Adoption	To irrigate high water consuming crops and poor water conservation and recharge measures
Crops	Potato Kufri Bahar (3797)	Adopted	Environmentally friendly, sunlight resistance, consumer preference and high profit
	Sugarcane Merathiya	Discontinued	Closing of kalarash sugar mill
Animals	Goat	Passive rejection	Social status and religious values
	Poultry	Passive rejection	Social status and religious values

problem. Quantification of data was done by ranking the problems based on the responses collected from the farmers. On the basis of RBQ and VBI, it was found that weed (local name: Barru) in bajra (Pearl millet; *Pennisetum glaucum*) with VBI of 7012.8 is a major threat to bajra causing highest damage to the crop with average loss of 72% followed by stem rot (causative agent- *Sclerotinia sclerotiorum*) of Indian mustard (*Brassica juncea*) with VBI of 6580 and average loss of 70%. We also categorised the problems based on the possible

type of solutions. Since majority of the farmers of Santa village has the buffalos, Low fertility in buffalo observed as a third problem. Late blight of potato, Foot and mouth disease (FMD) of cattle, Premature delivery of cattle, Mimicking weed in wheat, Loos smut of wheat, and White rust of mustard observed as other major problems faced in the village (Table 4).

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 Santa villagers. Major problems were also discussed with the Zonal Agriculture Research Station (ZARS) and Krishi Vigyan Kendra (KVK) scientists and extension experts of Morena in our institute seminar. This has indicated scope and point of intervention by research institutes, extension workers through integration approach to mitigate the problem. 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 problem identified as the mimicking weed in Bajra (*Pennisetum glaucum*) and stem rot of mustard (also known as *Sclerotia* stem rot). The mimicking weed was identified as a *Pennisetum purpureum* (Since there are no plant taxonomists in our group, we identified the weed name through internet based on morphological characters of weed; Scientists in RVSKVK, Morena claimed it as Pennisetum helpans). The action plant suggested that uproot weed plants before shading of seeds and burn them to reduce spread of seed bank. The second problem i.e. stem rot of mustard is caused by *Sclerotinia sclerotiorum*. The solution suggested as Use proper field sanitation practices, use certified seeds of resistant/tolerant varieties, Crop rotation with nonhost crops like, rice and maize and Preparation of compost pits to avoid pest transfer through raw cow dung. There is a need for focus on ground water recharge through adoption of on-farm water conservation techniques, demonstration and training on seed technology and all these solutions can be a strong output generator if training in special area provided to farmers (Landge & Tripathi, 2006). To tackle marketing issues, need to bring both APMC and cocoon market in nearby study village 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 undercurrent 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. The methods used in this study seem to have been successful in assessing farmers' priorities and preferences in variety choice, and have yielded hierarchy of the factors determining such choices. Therefore, this field experience training is unique module serve village as a social laboratory for effective

Table 4: Problem identification and prioritization

Problems	Individual Ranks										RBQ	Average economic loss (%/Annum)	VBI	Rank
	1	2	3	4	5	6	7	8	9	10				
Mimicking weed in Bajra	22	8	-	-	-	-	-	-	-	-	97.4	72	7012.8	1
Late blight of potato	12	6	5	5	2			-	-	-	93.4	44	4109.6	4
Low fertility in buffalo	15	12	3		-			-	-	-	97.7	60	5862	3
FMD of cattle	15	10	5					-	-	-	87.1	52	4529.2	5
Stem rot of mustard	24	5	1					-	-	-	94	70	6580	2
Premature delivery of cattle	2	3	10	8	7			-	-	-	75.1	53	3980.3	6
Mimicking weed in wheat	3	3	8					-	-	-	84.3	30	2529	7
Loos smut of wheat	3	2	7					-	-	-	86.7	21	1820.7	8
White rust of mustard	4	2	7	2	5			-	-	-	79	20	1580	9

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.

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