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PARTICIPATORY RURAL APPRAISAL (PRA) FOR SUSTAINABLE DEVELOPMENT OF RAINFED AREA IN SOUTHERN RAJASTHAN – A CASE STUDY

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ABSTRACT

Participatory Rural Appraisal (PRA) of maize based rainfed farming system was conducted in Operational Research Project area of All India Coordinated Research Project for Dryland Agriculture at Village Kochariya, district Bhilwara in the Rajasthan. For identification of problems of rainfed farming system in particular and agricultural systems in general and their possible measures, the participatory rural approach was applied. The resource map, ecological map, geographical map and other important maps related to watershed development programme were prepared. Information collected were analysed and interpreted with special reference to identification of the items of priority needs of the people of the area. Results of PRA analysis indicated that Kochariya watershed has three major constraints viz. frequent drought, poor socio-economic base and lack of agro advisory services. On the On the basis of results obtained, it is suggested that pasture land can be developed by adopting agro-forestry/ agro-horti-cum-livestock production in the watershed. Based on PRA, land use models like diversification of maize based rainfed cropping systems, natural fallow (to study natural regeneration process and biomass production), up-gradation of local non- descript breed for higher milk production and big farmers can adopt fruit planting and inter cultivation of vegetables with some financial support of fencing. Amongst soil and water conservation measures, ponds and nadies water harvesting structures and check dams at appropriate location in the area were considered to reserve the runoff water during rainy season.

INTRODUCTION

A prerequisite for developing a comprehensive plan of watershed development is the timely availability of detailed information on the watershed resources (Bhati, 1993). The Participatory Rural Appraisal (PRA) has proved to be an efficient tool to compile and process important information for the watershed area. PRA derives its strength from the participation of local people right from the beginning stage (Mukherjee, 1993) is reliable and cost effective making it possible to adopt the most appropriate activities in watershed development programme.

In response to the recognition of the effective management of natural resources with bottom to top approach (Anonymous 1991 and 1994), the Kochariya watershed was selected on the basis of 70% rainfed area of total cultivated area under Operational Research Project area of All India Coordinated Research Project for Dryland Agriculture to collect of information on various watershed resources for the preparation of agro-ecological, social resources, crops, animal and drainage maps which were prerequisite for development of rainfed area on watershed basis. Keeping this in background, present study was undertaken to compile correct feed back about the area and its holistic development through participatory approach.

RESEARCH METHODOLOGY

PRA was conducted in the village Kochariya in the year 2007 for collection of information about the problems and status of rainfed farming system. Farmers were introduced to the PRA techniques. Some key informants (KI) among the farmers were selected on the basis of their education from different category of farmers to gather first hand informa-

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tion. Besides farmers, village panchayat and development authorities were also included in the PRA. Matrix ranking techniques was adopted to study the decision behavior of the farmers about the preferences and attitude towards a particular topic of interest/things. Wealth analysis of farmers was also conducted to determine the relative wealthiess of all members by the villagers.

The farmers of village Kochariya were introduced to the PRA techniques and transact walk was made to gather first hand information. Afterwards, group discussions with all the categories of the farmers were held. The local panchyat was also taken into confidence to collect baseline data. The information was also collected from District Rural Development Agency. Adequate participation of farmers in all PRA exercises was ensured by involving social processes namely awareness, involvement, learning and organizing.

RESULTS AND DISCUSSION

Bhilwara district ($24^0 20'$ N latitude and $74^0 20'$ E longitude) is situated in zone IV-a of the Rajasthan and National Agro-Ecological Sub-Region IV. The selected watershed Kochariya is located 20 km away from Bhilwara on Jaipur-Udaipur National Highway. The Kochariya Watershed covers an area of 974 hectare, of which 303 hectare was uncultivable land.

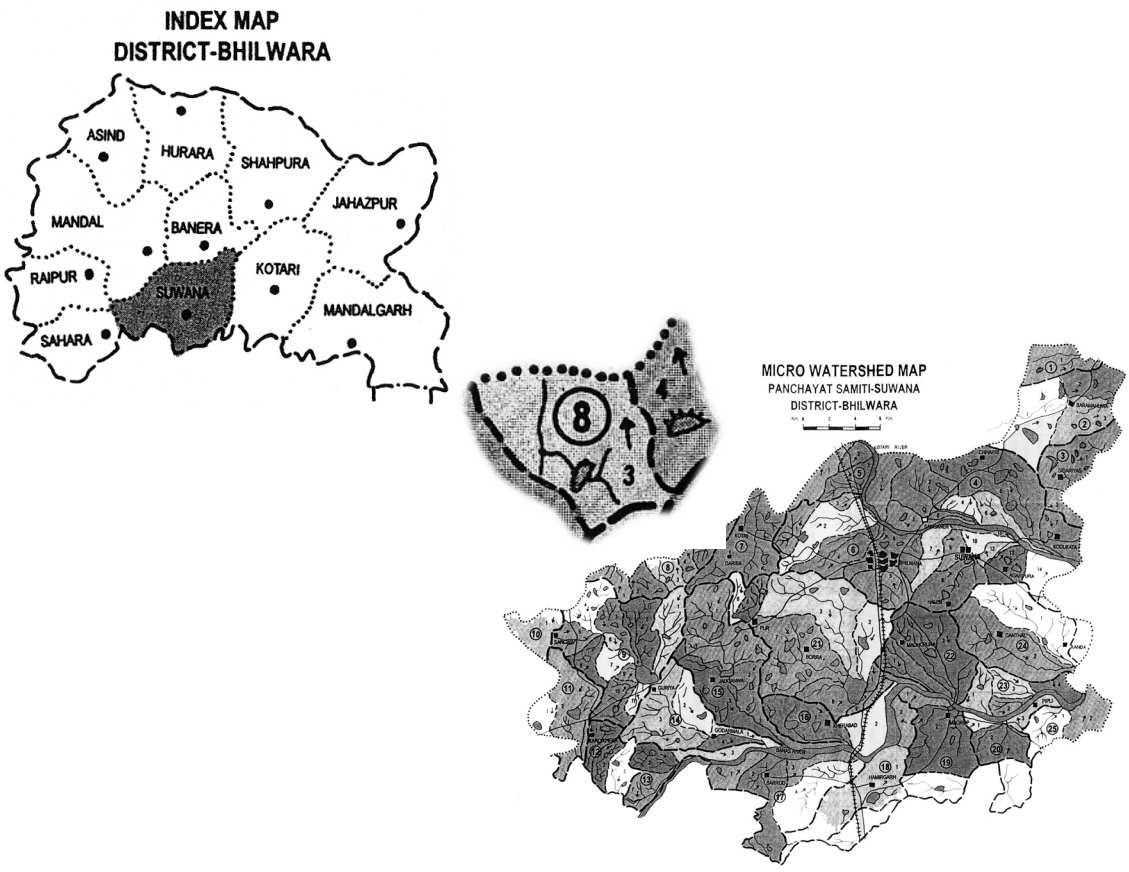


Fig 1 : Geographical location of watershed and mapping of geo-hydraulic features

Transect walk

In order to get clear idea of the topography and terrain cross-country walks with the farmers, from ridge to valley were conducted in three portions of the micro watershed. Discussion with farmers and those met enroute facilitated to understand how and why resources are being managed. Transacts through Samya road, Padeta road and Mandapiya road were made with the villagers. The arc demarcated with ridge lines and drainage line were demarcated (Fig. 1 & 2)

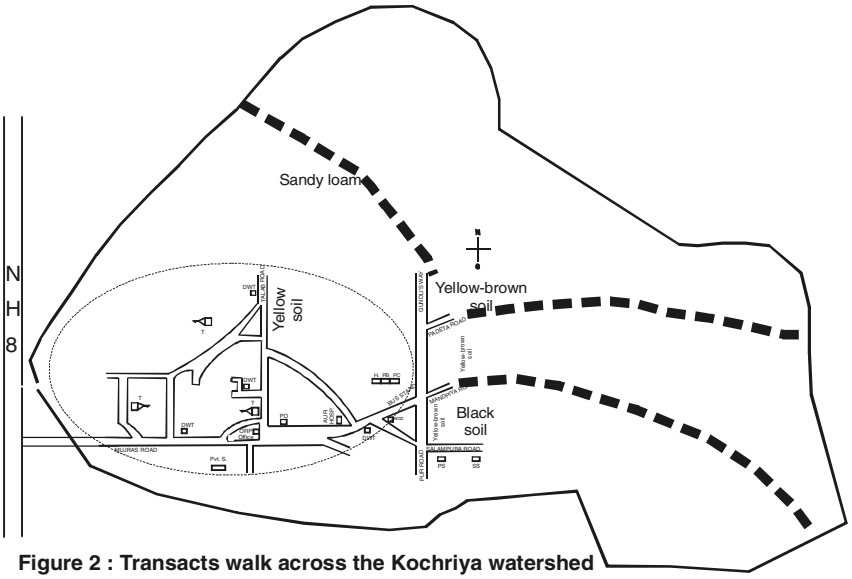


Figure 2 : Transacts walk across the Kochriya watershed

Social and resource map

During PRA exercise, a social and resource map of the watershed areas was prepared (Fig. 3). The village has four demarcated areas locally known as Allottee, Samya, Rail and Jharana. The area is dominated by Kumawats constituting about 51.09%, of total population.

The rest were Gurjar (11.66%), Pareek (9.12%) and scheduled caste (9.7%). The village has three primary schools and one secondary school, one medical & ayurvedic hospital, Govt. post office, V.E.W. headquarter, branch of GSS and Patwari headquarter. Gramin Anchalik Bank is situated at village Gadarmala which is 8 kms. away from Kochariya village. Veterinary hospital is located at Pur town (about 7 km. away from Kochariya).

Farmers of the village can be categorized as marginal (<1.0 ha.), small farmers (1-2 ha.), medium (2-5 ha.) and big farmers (>5.0 ha.). The income source distribution of different of farmers categories is shown in (Fig. 4). As far the income source of the small categories is concerned 50% of the income from off-farm employment labourers, 40% from agriculture and only 10% from animal production. In case of big farmers, out of total income, 70% is from agriculture and remaining 30% is from animal production. Most of the medium farmers (90%) are engaged in agriculture and animal production.

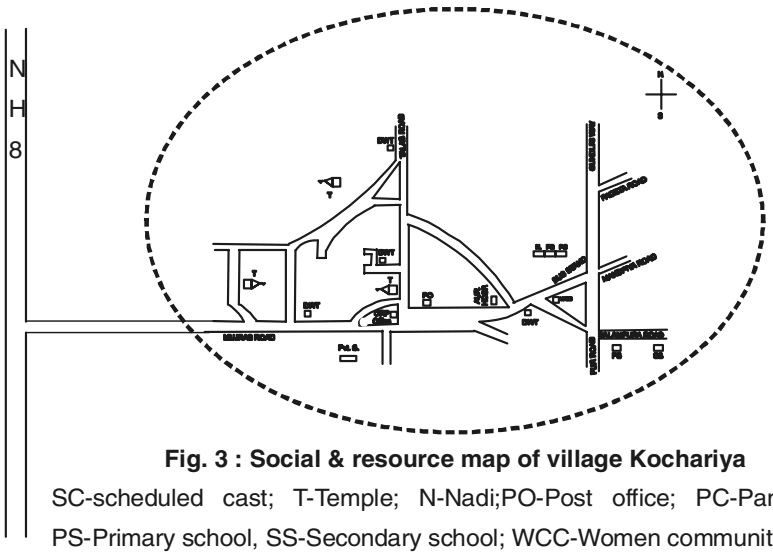


Fig. 3 : Social & resource map of village Kochariya

SC-scheduled cast; T-Temple; N-Nadi;PO-Post office; PC-Panchayat; PS-Primary school, SS-Secondary school; WCC-Women community centre

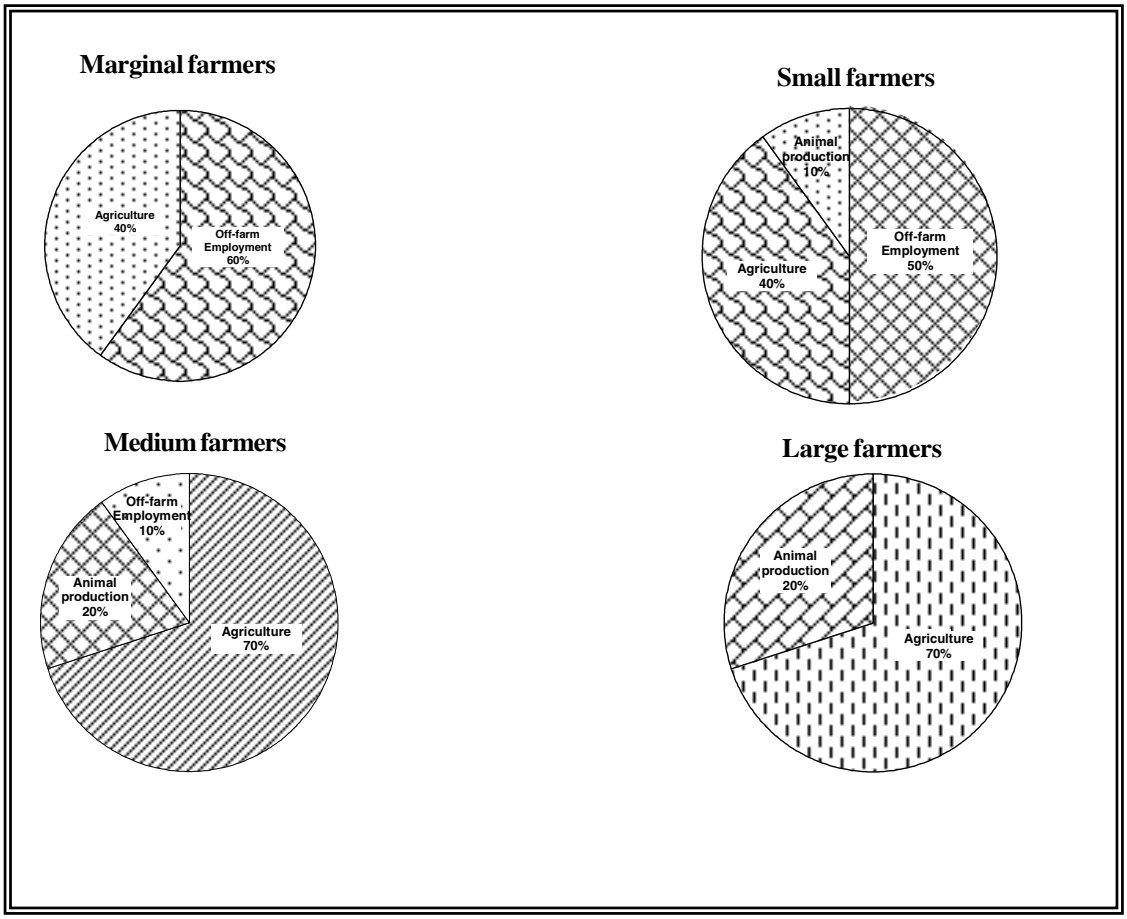


Fig. 4 : Income source distribution of different categories of farmers in the village Kochariya

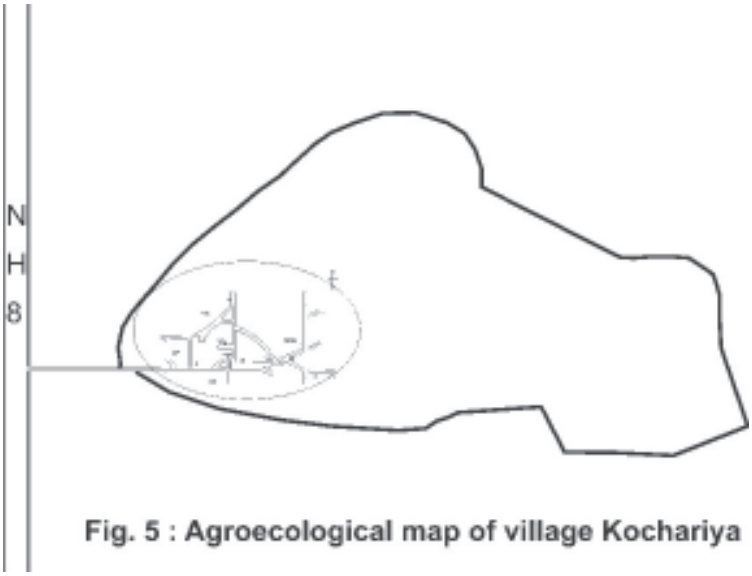


Fig. 5 : Agroecological map of village Kochariya

Agro -ecological map

During PRA, farmers were guided to prepare agro ecological map of the village. The plan map of the area, only describing important features, were distributed among the farmers. The final agroecological map is shown in Fig. 5. As the Fig. 5 shows, soil of the area is sandy loam to clay loam. The cultivated land is a part of one hill watershed and is divided into different micro drainage units as a result of intensive biotic activities during the past. It was suggested by the villagers to transport water runoff to big and small nadis and anicuts.

Crop technology map

Crop technology map of the village based on the information collected during PRA exercise is presented in **Fig. 6**. The percentage cropping pattern and land use is shown in **Fig. 7.**

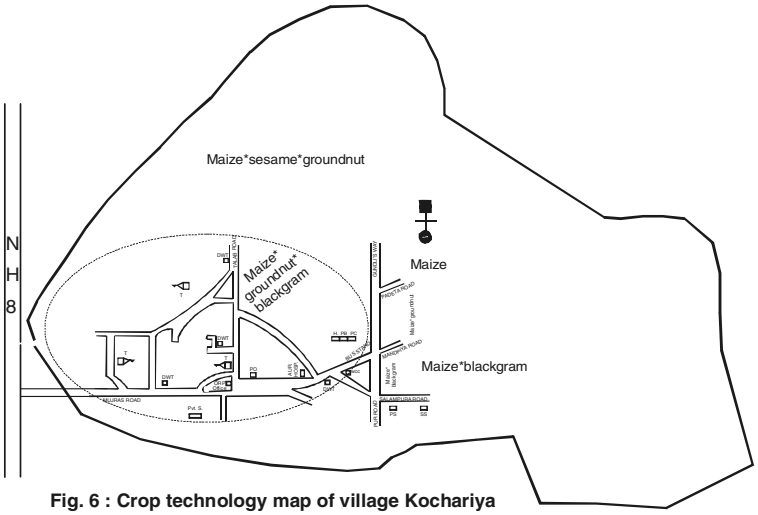
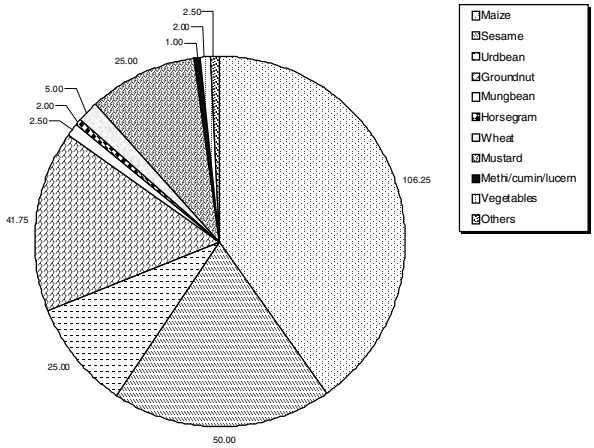


Fig. 6 : Crop technology map of village Kochariya

A comparative economic analysis of important crops revealed that mustard and groundnut gives highest net income followed by sesame, black gram and wheat, respectively. During a PRA exercise, farmers showed their enthusiasm to grow more intercrops. However, the main constraints were non availability of quality seeds and lack of technical know-how for their cultivation especially sowing. Maize though grown as a major kharif crop, it gives lowest net income during deficit rainfall years.



Animal husbandry map

Animal husbandry has surprisingly decreased. Majority of the farmers keep deshi cows, buffalo, goat and sheep and have favoured keeping cross-bred cows as it gives higher net income. Major amount of milk produced is consumed in the family itself and about 20-50% of total production is sold out. Villagers pointed out that, if fodder availability during drought period is ensured and proper milk market facility animal husbandry training is provided, they can start commercial dairy in the village. Villagers also pointed out that 3 to 6 tonnes of FYM per animal/year is obtained generated in the village from these animals.

Seasonal analysis of workload

A seasonal analysis of the work load and labour demand revealed that the work load for male and female remain high in March, April, July, September, October and November. The participation of farm women in agricultural operation was 63.34% who work in their own fields whereas only 36.66% work as agricultural labours. On an average, the farm

women worked for 23.68 days in one month per hectare of the cropped area. Eighty per cent of the work load of women comprised sowing, weeding, assisting in spraying of insecticides and pesticides, harvesting and storage of the produce or sometimes carrying it as head load to the transport vehicles.

Trend analysis

Trend analysis identifies the increasing or decreasing trends of important aspects. Nine parameters were evaluated, taking 1985 as the bench mark year. Rainfall and ground water level has decreased in the past but recently started declining due to the over exploitation from the tubewells (**Fig. 8**). The surface water also showed more or less the similar trend. The land holding size has decreased between 1985 to 2005, because of increase in population, similar trend was observed in case of cultivated land. The crop production, per unit area has increased by almost three folds during the same period. There has been an increasing trend in clusterbean and decreasing trend in area of vegetables, wheat and moongbean. Use of tank silt for moisture conservation and soil health, biofencing, growing of grasses in field sides, wall and use of dung of blue bulls for spray on crops to protect from ble bulls are common ITKs prevalent in the village for many years.

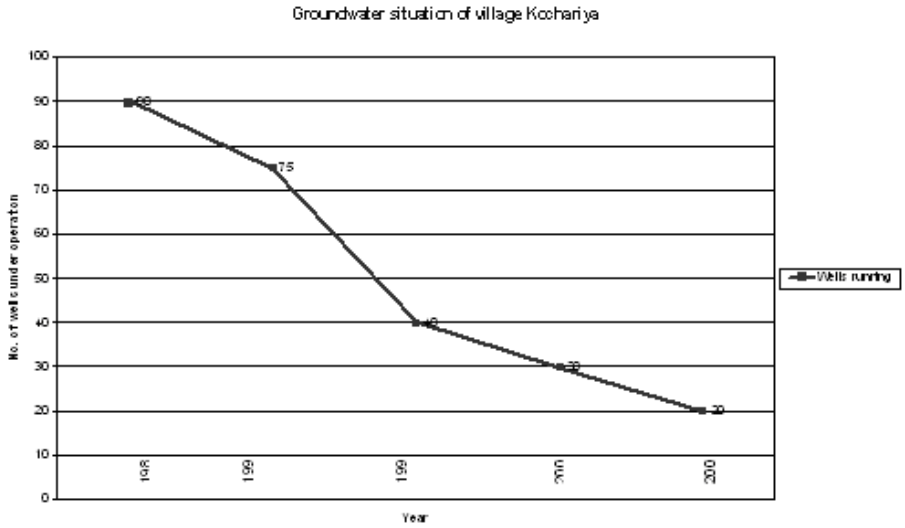


Fig. 8 : Groundwater situation of village Kochariya

Table : 1 Matrix ranking of different factors for development of rainfed agriculture in ORP watershed at Kochariya

Farmers	FDER	SEB	AAS	DIG
1	++++	+++	++	++
2	+++	++	+++	+
3	++++	+	+	+
4	+++	++	++	+
5	+++	+++	++	++
6	+++	++	++	++
7	++++	++	++	++
8	+++	++	+++	+
9	++	+++	++	+
10	++	+++	++	+
11	++++	++	++	++
12	++++	++	+	+
13	++++	++	++	++
14	+++	+	+	+
15	+++	++	++	+
Total	49	32	29	21
Rank	I	II	III	IV

FDER : Frequent drought and erratic rainfall; SEB : Socio-economic base;
AAS : Agro-advisory services; DIG : Diverse income generation opportunities

Matrix ranking

The matrix ranking gives a clear cut idea about the preferences and attitude towards a particular topic of interest/things of villagers. It also helps to understand farmers/villagers and their priorities/problems, liking and disliking for particular horticultural plants etc. Thus, it helps to gain better understandings of farmers decisions making process, criteria used for making priorities etc. During the discussion with the farmers, frequent drought and erratic rainfall, poor socio-economic base, availability of agro-advisory services and opportunities for diverse income generation have emerged as the main problems and factors for effective development of rainfed agriculture. (Table 1)

Venn Diagram

The main aim is to get the villagers perspective on the impact/influence of local/outside institutions in a particular area. The knowledge of institutional arrangement will help in the capacity building and help of the institutions for development of rainfed agriculture in these areas. (**Fig. 9**)

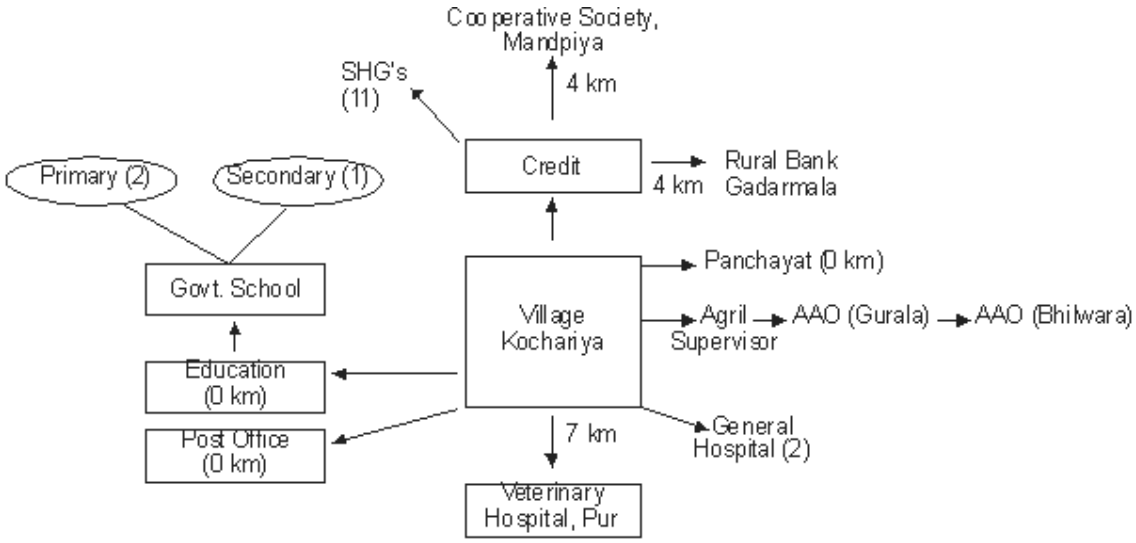


Fig. 9 : Venn diagram of different village institutions in Kochariya village Wealth Ranking

Wealth ranking is a process to determine the relative wealthiness of all members and ranking rich or poor is determined by the villagers themselves. It helps in knowing the wealth possessions by villagers, identify the resourceful and resource poor villagers and also know the criteria of wealthiness. In the village Kochariya, most of the farmers were poor and their annual income was less than Rs. 75,000 per household. Only 5 per cent farmers have annual income between Rs. 1.5-2.0 lacs. In the village most of the farmers do not own the required resources for optimum farming like bullock cart, tractor, engine, pucca animal shed and manger.

Priority analysis

Priority analysis of agriculture related problems revealed that the farmers' immediate felt needs were good quality seeds, improved methods of composting, improved methods of animal feeding, water harvesting and practices of drought management especially in maize and groundnut. The second in order comes the supply of electricity. The third is the conservation of water through anicut and ponds. Large farmers showed interest in ber, aonla, lemon and other orchard management options.

Table 2 : Priorities of farmers during focused group interaction (n=20)

Issue	No. of farmers	Ranking
Improved compost making	20	I
Termite control	16	II
Saline soil improvement	12	IV

Problem of water stress in orchard	2	VI
Improvement in nadies	2	VI
Water harvesting through ponds	16	II
Improved implements for sowing & hoeing	14	III
Improved varieties	20	I
Improved grasses	4	V
Animal camps	20	I
Improved methods of animal feeding	20	I

Table 3: Suggestions offered by the farmers for development of agriculture in the village (n=60)

S. No.	Suggestions	Frequency	Ranking
1	Mass awareness programme on drought management and Govt. support for resource development	50	3
2	Training	33	3
3	More frequent visit by the scientists to farmers field	30	4
4	Supply of inputs at required time	58	1
5	Frequent meeting of scientists and state officials	20	5
6	Farmers resource centre (All information and resources availability in village)	55	2

Technology gaps

(i) Farmers of the village are not using improved varieties in crops like maize, blackgram, greengram, clusterbean, groundnut and sesame.

(ii) In most of the crops optimum plant population is not maintained.

(iii) In maize and wheat most of the farmers used seed rate higher than recommended, while in groundnut farmers used less seed rate.

(iv) Most of the crops are not sown at recommended spacing. Maize is grown at narrow spacing, while oilseeds and pulses are sown at wide row spacing.

(v) Farmers are not practicing intercropping, which is an asset in dry land farming.

(vi) Fertilizer use both in dryland as well as irrigated conditions is not as per the recommendations. In most of the kharif crops only about 50 per cent of the farmers are applying basal dose of fertilizer. That is also only through DAP.

(vii) Most of the farmers are not using herbicides for weed control.

(viii) There is lack of use of plant protection measures to control insects, pests and diseases in different crops.

(ix) Suitable soil and water conservation measures are not adopted by the farmers.

Constraints

Following operation, institutional and socio-economic constraints were identified for low productivity of rainfed farming system.

Operational

(i) Involvement of high risk in dryland farming hinders the adoption of new technology which involves monetary inputs.

(ii) Timely availability of inputs like fertilizer, seed, insecticides, herbicides, implements etc. at village level.

(iii) Unavailability of seed cum fertilizer drill.

Institutional

(i) Lack of easy accessibility of credit facilities to the farmers as there is no nationalized bank/ cooperative society to provide required financial support in project area.

(ii) There is no organized marketing facilities for the supply of required agricultural inputs viz. improved seeds, insecticides, herbicides, implements etc.

Socio-economic

(i) Poor economic conditions of the dryland farmers restricted the adoption of improved technology.

(ii) Small land holdings and diversion of farmers for non-agricultural works in urban areas.

(iii) Illiteracy of the farmers is also a big barrier in understanding and adoption of technology.

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