

# **IMPACT STUDY OF AGRICULTURAL EXTENSION PROGRAMME**

In Surendranagar Area of AKRSP(I)

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This study is one of a series of impact studies AKRSP(I) is carrying out on its work. Overall, we aim to impact on the quality of people's lives in rural area of Gujarat, and one of the indicators for this is increase in peoples incomes. Farmer families constitute by far the majority of the rural population, and so the improvement in farm production is an important avenue to improving the quality of the life of rural families. Agricultural extension therefore plays a very important role in AKRSP(I)'S work, adding value to our main focus of Natural Resources Development, thereby helping us to achieve our mission.

These case studies are basically working documents, for our own use, in an effort to constantly improve our performance. They are therefore often quite critical, but constructively so. We share these findings with a wider audience hoping they may assist other in their work to improve the lives of the rural poor.

(Barry Underwood)  
Chief Executive Officer

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## **ABSTRACT**

AKRSP(I) has been working in the field of agriculture extension for fifteen years, but sustainability in agriculture became the focus only after 1994. In the drought prone area of Surendranagar district of Gujarat, important agriculture activities such as use of neem oil and rancid bajara as bio-pesticide, inter cropping maize with cotton for pest management, organic compost, improved variety of seeds, drip irrigation as a water saving technique, and horticulture have been introduced through demonstrations, training programmes, field days, and exposure visits. The organization also makes efforts to involve people in its agriculture research activities and involve women at all levels. This study tries to assess the impact of these efforts and looks into possibilities for their improvement. Most agriculture interventions are according to the people's need. However, the spread effect of these activities is low, and involvement of women in the programme is also low, in spite of such effort by the organization. There is a need to use different modes of communication to reach more farmers.

## **INTRODUCTION**

Agriculture is the focal activity of rural areas, and most economic activities related to agriculture development in rural areas can take place through improvements in agricultural inputs and practices. Research is being done in laboratories to bring about improvements in agriculture, but the results hardly ever reach farmers. Little importance is given to diffusion of research findings. Useful research findings remain confined to the laboratory or books, and do not reach farmers since they do not have easy access to them. Even if they have access they do not understand the scientific language. Similarly, scientists do research on subjects of their liking, have little contact with farmers, and are not aware of their requirements. Thus their research does not match with farmers' needs. To reduce the gap between farmers and researchers and provide better diffusion of knowledge, agriculture extension volunteer were appointed by government. However, the experiment has not been successful, because they have to cover a large number of villages in limited time, and besides extension work, they have to carry out many other activities such as providing agriculture related information to higher officials, attending monthly meetings in their headquarters which are located far from their working place, and accompanying visitors. Unless scientific research reaches farmers and is utilized by them, all research efforts will be wasted.

AKRSP(I) has been working in the economically poor and environmentally fragile rural areas of three district – Bharuch, Junagadh, and Surendranagar of Gujarat for fifteen years. The organization is trying to achieve sustainability in the field of agriculture, and serious efforts have been made in this direction since 1994. Different techniques for increasing productivity and reducing the cost of inputs have been introduced. The organization is concerned to reduce use of environmentally hazardous fertilizers and pesticides to make agriculture more sustainable. The objective is that a large number of farmers should receive the available knowledge, and adopt the latest low-cost technologies to increase income from agriculture.

Agriculture production is a complex process, affected by many factors like climate, soil, and water. In addition to this, socio economic factors also play an important role in crop production. For agriculture productivity 5 “A”s play a major role, they are Awareness, Attitude, Appropriateness, Access and Affordability. There is a need to bring about the awareness among farmers and change their attitude to improve agricultural technologies. The awareness raising of farmers is mainly done through farmer's training, both at the village level and government training centers. The attitudes of the farmers are changed by conducting field demonstrations of improved technologies on farmer's fields. AKRSP(I) has been conducting training programmes on improved technologies like improved crops varieties, integrated pest and nutrient management, use of organic manures and their role in sustaining soil fertility, water management and horticulture. Appropriateness of any technology, that is its acceptability in the local context, is very important. This is confirmed

during field visits and field days during which farmers opinions are sought. Sometimes technology itself needs to be modified under local situations. Access to, and affordability of improved inputs is also equally important in improving crop productivity. Once the farmers are made aware, access to credit and inputs help to increase the crop productivity. AKRSP(I) has been operating credit and input supply activities through local level village institutions (VIs). The supply of organic manures and compost, bio-pesticides, grafts of fruits species like mango and chickoo (Sapota) are good examples of providing access to the farmers after bringing about a change in awareness. (Vohra, M.S., 1998)

AKRSP(I) started extension activity with field demonstrations of improved agricultural practices, like improved varieties, proper seed rate, fertilizer doses, and pesticides. Farmers training is done both at the village level and government training centers, such as those of agriculture university and farmers training centre. Input supply activity of seeds, fertilizers and pesticides is done through local level village institutions. Horticulture development is done through the supply of grafts such as mango, chikoo, guava, pomegranate, custard apple and ber.

At this stage, the organization feels it is necessary to study the impact of its efforts so far, in order to decide its future course of action. This study has been carried out in the Surendranagar programme area of AKRSP(I).

### **Study area**

Surendranagar is a drought prone area with average annual rainfall of 490 mm and 80 percent variability of rainfall. The area faces an acute water problem, for drinking purposes as well as irrigation. The area under irrigation is only 10 percent and due to scarcity of water most of the farmers can grow only one crop (kharif/monsoon) in a year. For the remaining duration of the year they have to depend on labour work for their livelihood. Main crops of the area in Kharif are bajra (pearl millet) sesame, Mung (green gram) and moth beans. Wherever water for support irrigation is available farmers grow cotton as the Kharif crop. since cotton is a six to eight months crop, two to three months support irrigation is required after monsoon. If irrigation is available, farmers cultivate wheat, cumin and vegetables in winter. Irrigation in summer is rare, and is only used for groundnut, fodder crops like alfalfa and sorghum sown in very small area. Agriculture productivity is quite low because of water scarcity as well as low fertility of sandy to sandy loamy soil.

### **OBJECTIVES**

The objectives are to study:

1. Out come of extension communication methods adopted by AKRSP(I) for dissemination of agriculture related knowledge.
2. The spread effect of agricultural technique introduced by AKRSP(I).
3. Participation of women in agriculture extension work.

### **METHODOLOGY**

#### **Sampling**

AKRSP(I) is working in 59 villages in the Surendranagar programme area for development of different natural resources. A total of 30 villages are covered under the agriculture extension programme of which eight villages (26%) were selected for this study. A total of 65 beneficiary farmers, who are members of village institutions (men and women) were studied through a specially prepared questionnaire. Some may have benefited from all agriculture extension activities, and some may have benefited from one or more activities. There is also

a possibility that a farmer may be counted more than once, while discussing different activities. For comparison purposes, we also studied 20 non beneficiary farmers of which 10 are members of village institutions and 10 are not members of village institutions. While non members are not expected to be direct beneficiaries of AKRSP(I)'s programme, there is an assumption that they would benefit through spread effect. Selection of villages, beneficiaries, and non-beneficiaries was done randomly. (Please refer Table 1)

**Table 1: Sample Design**

Sample Villages	Beneficiary Farmers	Non-beneficiary farmers
Bhimora	3	0
Dhandhalpur	15	5
Junajasapar	7	2
Kheradi	11	4
Sokhada	10	4
Samatpar	6	2
Mokasar	5	1
Rajavad	8	2
<b>Total</b>	<b>65</b>	<b>20</b>

### **Data Collection**

Descriptive information was collected from local knowledgeable people (elderly people, panchayat members, chairpersons and secretaries of village institutions), shopkeepers of agricultural inputs, government officials, AKRSP(I) staff members and non-beneficiaries of the programme.

Agriculture extension work is carried out mainly through extension volunteer, demonstration, exposure visit and audio visual aids. Information related to the use of these communication resources is collected from sample beneficiaries.

AKRSP(I) has undertaken many agriculture extension activities during the last five years but for the purpose of the study only Neem oil, Rancid bajara, Inter cropping maize with cotton for pest management, Organic compost, improved variety of seeds, Drip irrigation, and Horticulture were considered as they are expected to have a large spread effect :

## **FINDINGS**

### **Use of Resources of Extension Communication**

#### **Extension volunteers**

The extension volunteer is a local person and is selected with the help of village institutions. She/he works as a bridge between AKRSP and villagers. Extension volunteers have better access to people as they speak the same dialect and are aware of local culture. They get more opportunity to talk about new technologies of agriculture to different groups on different occasions. Extension volunteers are given training on different agriculture techniques, which are suitable to the area. This improves their working efficiency, knowledge and confidence. For agriculture extension work the personal contact method, and extension volunteer model are used. At present 18 extension volunteers are working in the Surendranagar area. During the study a total of four extension volunteers were interviewed. They organized meetings, demonstrations and training programmes for local people. Many times they talk about agricultural activities in informal gatherings. Since they are easily accessible, farmers frequently come to them for advice and guidance. They however, have limitations, and they cannot give an expert's opinion on many problems posed by the farmers.

## **Demonstrations**

Though AKRSP(I)'s objective is to achieve a spread effect to a large number of farmers, there is still a long way to go. In most case only those farmers have adopted the new technology on whose farm demonstrations took place, and those with whom extension volunteers and AKRSP staff have close contact. None of the sample non-beneficiaries is aware of demonstrations organized by AKRSP. Those that are not members of the village institutions, obviously do not get to know about these. While new technologies are demonstrated with full sincerity, follow up work is not done with the same intensity.

While many demonstration take place every year, very few demonstrations are continued for longer periods; most are discontinued after one or two years. Table 2 indicates that except for organic manure and IPM, no demonstration is continued for more than two years. For discontinued demonstrations, follow-up is also not done. In all these cases, efforts and energy are wasted. It is important to give fewer demonstrations with more intensity. Demonstrations have to be decided according to the need to the area and should be continued for a longer period, so that the spread effect of the new technique can be noticed. AKRSP(I) has been giving demonstrations on organic manure for the last five years with intensity. The spread effect can be seen in terms of increase in the number of users and quantity of organic manure used. On the contrary demonstrations of improved variety of seeds of paddy, tomato, potato, brinjal etc., are not very effective as they were discontinued after one or two years. During the study it is found that farmers did not even remember when these demonstrations took place. It is observed that farmers will adopt that technique for which they can get regular guidance, till they become confident of handling it on their own. New demonstrations every year make farmers confused about what to adopt. Fewer, but more effective demonstrations are required.

Unlike other agriculture research centers, AKRSP does not have demonstration field of its own where demonstrations can be done under controlled conditions. All demonstrations are done on farmer's fields in natural conditions, where problems faced by farmers could be understood easily and changes made in techniques. When the demonstration is given on the farmers' field, the entire family (men, women and children) get an opportunity to learn. In the informal environment on the farms, farmers feel free to come and observe. Since it is their own farm; farmers understand the limitations of the technology. So far AKRSP has given demonstrations of many new techniques and attendance in all of them was quite high. Fifty two out of 65 sample farmers attended at least one demonstration.

AKRSP believes in participatory learning. In participatory learning, demonstrations are given on the farm, and the farmer is asked to monitor the growth by keeping a record. On the basis of feedback given by the farmer, modifications are made in the techniques. In Sokhda village demonstrations on organic manure, inter cropping, and integrated pest management were organized. Preparation of organic manure in a participatory manner gave scope for learning and modification. In the second year of the experiment, tobacco dust (to reduce pest attack) and poultry manure (to increase micro nutrients) were added, to organic compost on the basis of suggestions made by villagers. In the third year, fish manure was added, again on the suggestion of the villagers, to enrich the compost. In 1998 some farmers complained about the foul smell of organic compost which was putting them off. On the basis of the feedback from the farmers, AKRSP inserted perforated pipes in the fermentation pit which helped in reducing the intensity of smell. The women's groups also participated in deciding marketing strategy, price fixation, and quantity of organic manure to be filled in one bag. During the study about 25% farmers liked the idea of participatory demonstration and learning. Farmers also suggested that after every new experiment, AKRSP staff members should get feed back from them and discuss where there is a need to make modifications. It is not necessary to adopt a package of any new technology in its original form; it can be modified to suit local conditions. If farmers participate in modification then they develop a

sense of belonging, and the rate of adoption will be high. The sample farmers suggested that experience with new technology should be discussed in village institution meeting, so that other farmers can learn from adopters. It is assumed that village institutions are of villagers and they would discuss these issues on their own in the VI meetings; However, they have to be empowered in terms of taking initiatives on their own. They need AKRSP(I)'s support and guidance to carry forward the new ideas through their village institutions. Five women of the sample expressed a positive attitude about participatory demonstration; they would like to have these kind of experiments on their wada land (homestead fields). They would also like to know more about new technologies. Involvement of more people may take more time in carrying out new experiments, but will lead to a higher rate of adoption. AKRSP(I)'s experience indicates that wherever people's participation in demonstration is high, the rate of adoption is also high.

**Table 2: Type of demonstrations given by AKRSP(I) from 1994 – 1998.**

No.	1994	1995	1996	1997	1998
1.	Use of bio gas slurry	Compost preparation	Preparation of organic manure through Village Institutions	Preparation of organic manure through Village Institutions	Preparation of organic manure through Village Institutions
2.	Use of oil cake	-	-	-	-
3.	Inter cropping of green gram and bajara	-	-	-	-
4.	-	-	Use of Neem oil as bio pesticide	Use of neem oil as bio pesticide	-
5.	IPM through maize and cotton inter cropping	IPM through maize and cotton inter cropping	IPM through maize and cotton inter cropping	-	-
6.	IPM video cassette	-	IPM: biological control of reproduction of pests	-	-
7.	Improved variety of tomato, paddy potato	-	-	-	-
8.	-	Improved variety of ginger, paddy, bajra	-	-	-
9.	-	-	-	-	Different variety of cotton, brinjal, potato, radish
10.	-	-	Drip irrigation	Drip irrigation	Drip irrigation
11.	-	-	-	Horticulture	Horticulture
12.	-	-	-	-	Rancid bajra flour as bio-pesticide

Source: AKRSP(I) Annual Progress Reports (1994-1998)

### **Exposure visits**

Exposure visits are one of the more effective methods of diffusion of information on new techniques of agriculture. AKRSP(I) uses these techniques on a large scale. Farmers are taken two to four times in a year to other places to learn about different techniques of agriculture. Table 3 shows the type of exposure visits and the extent to which they have used the acquired knowledge.

**Table 3: Type of exposure visits (1994-1998) and use of knowledge by the sample farmers.**

Types of exposure visit	Adoption by farmers		Total
	Yes	No	
1. Horticulture	10	5	15
2. Bee Keeping	0	7	7
3. Potato cultivation	11	3	14
4. Kantola (a vegetable)	13	1	14
5. Bajra	14	5	19
6. Wheat	15	3	18
7. Cumin	14	2	16
8. Watermelon	0	12	12
9. Chilly & other spices	0	8	8
10. Cotton	22	4	26
11. IPM	5	12	17
<b>Total</b>	<b>104</b>	<b>62</b>	<b>166</b>

*Source: Interviews with sample farmers*

Thirty seven (57%) sample farmers were taken on exposure visit to learn about different agriculture practices. Farmers are using the acquired knowledge on a selective basis. Majority of the farmers are using new techniques of cultivation of wheat, cumin and cotton crops, with minor changes. These crops are grown in the area and knowledge acquired about these crops could be easily applied. Some farmers acquired knowledge but did not use it as they found it unsuitable to local conditions. Farmers have given several reasons for not using the information provided during the exposure visits.

1. We did not understand many of the technical words and at times the language.
2. Input about which the information was given, is not available locally.
3. We have forgotten what we learned.
4. Local environment is not suitable for many experiments such as bee keeping and watermelon, shown during the exposure visit.
5. Information is not relevant to our area.

While farmers may not be applying what they learned in the exposure visits, they certainly enjoyed the visit. They came to know about many aspects of different agricultural regions, and during these visits they came closer to other villagers and AKRSP(I) staff. Many farmers shared their problems with others during the journey and got solutions. On the whole exposure visits are found to be useful by the farmers.

#### **Audio visuals**

Posters, pamphlet, charts, agriculture journals, and audio-visuals, are not much used for agriculture extension work. One video cassette on IPM (integrated pest management) has been made, but is being used rarely. None of the village institutions has received agriculture journals, which could be shared in their meetings. Some good agriculture journals are published in Gujarati, with information on low-cost agriculture technologies, such as pest control, seed conservation, efficient use of water, etc. These journals can be subscribed to by the village institutions. During the study sample farmers expressed that they would like to get agriculture journals written in simple Gujarati language and which can be discussed in the meeting of village institutions. In Surkui village of Bharuch programme are of AKRSP(I) this experiment has proved very useful. The secretary of the village institution read the



agriculture journals and mark useful information and shares in the meetings of village institution.

During the study, we found the benefits of new agricultural technologies introduced by AKRSP have gone to limited members of the village institutions. Many Village Institution members were not aware of AKRSP(I)'s agricultural extension work. Non-members had not attended any demonstration or agriculture meeting organized by AKRSP(I). Also in Village Institutions' meetings, new agriculture technologies were not discussed. In diffusing information, formal or informal village institutions can be very effective. Production of organic compost through village institutions is one of the successful examples of using an institutional base for effective extension work. There is a need to use institutional resources more frequently. Information about agriculture demonstrations and field days can be disseminated through these resources. Apart from AKRSP(I) formed village institutions, other informal institutions such as the bhajan mandal (religious singing groups), natak mandali (drama groups), haj committee, masjid committee, mela committee (village fair) can be of help in introducing low-cost agriculture technology to farmers.

### **New Agriculture Techniques Introduced by AKRSP(I)**

#### **Neem Oil**

Demonstrations using neem oil as a pesticide were conducted in 1994 but regular supply of neem oil through village institutions began only in 1996. Out of 65 sample farmers, 32 have used neem oil and are satisfied with it. According to them neem oil is much cheaper compared to chemical pesticides, and it is bio-friendly too. One litre of chemical pesticide cost Rs. 300 while one litre of neem oil costs Rs. 30. Farmers said that for one acre (2.5 bighas) land they have to spend about Rs. 1,500 on chemical pesticides, but if they used neem oil they would have to spend only Rs. 150. After spraying chemical pesticides farmers have to wait for 4-5 days for plucking vegetables while if they used neem oil they can pluck vegetables and fruits the next day. There is no need to take special precautions, while applying neem oil, but for applying chemical pesticides, farmers have to use gloves and mask. Many farmers do not have mask and gloves and therefore, they spray chemical pesticides unprotected. Fifty (80%) beneficiary farmers and 18(90%) non beneficiary farmers did not have masks and gloves to protect themselves at the time of pesticide spraying. Farmers complained of itching in eyes and irritation on hands. Such farmers also reported that excessive use of chemical pesticides had a negative impact on soil fertility as many micro nutrients were destroyed, while neem oil did not show this kind of side effect.

Looking at the benefits of neem oil, more farmers should have been using it. 50% of beneficiary farmers are using it, against 20% non-beneficiary. Thus we can say that awareness is medium among beneficiary farmers and low among non-beneficiary. Farmers who were not using neem oil said that while the effect of chemical pesticides could be noticed immediately, neem oil took some time to show its impact. Psychologically they were more confident using chemical pesticides, even if they had to pay more.

Farmers who have started using neem oil are very happy. They have reported substantial savings in terms of money. Also pest attacks have come down in their fields. According to them, repeated use of chemical pesticides increased the resistance power of pests; therefore, every year farmers have to use more chemical pesticides. On the contrary, neem oil increases the resistance power of plants. Pests do not like the bitter taste of neem oil and therefore, they do not attack plants. Chemical pesticides kill predators and parasites of pests and insects; this helps pests to become stronger. Neem oil is, however, biofriendly, and does not kill any predator or parasite. Farmers not using neem oil reported that there is a need to develop confidence among farmers about the utility of neem oil by giving more frequent field demonstrations. Farmers who are using neem oil complain that many times supply of neem oil is not adequate and therefore, they have to use chemical pesticides.

When local traders came to know about the increasing demand of neem oil, they started stocking it. They reported that every year the sale of neem oil is increasing. Many farmers said that they went to Mehsana (a nearby town) to bring neem oil. If more extension work is done and supply of neem oil is guaranteed there is a strong possibility that a majority of farmers may largely abandon using chemical pesticides.

#### **Rancid bajra flour as an alternative to chemical pesticides**

An earthen pot is filled with 5 kg bajra flour and sealed with wet soil. The pot is placed under a heap of cow during the month of May. Excessive heat and aerobic situation within the pot result in the degradation of bajra flour. The whole pot is taken out during the months of August and September, by which time the white flour has become rancid and green coloured. This flour is broadcast in the field. During 1997, five farmers used this flour in place of chemical pesticides for their cotton crop. In 1998 the same five farmers repeated the experiment. According to these farmers by spending only Rs. 25 they could control pest attack on one acre of cotton crop while other farmers spent Rs. 1500 on chemical pesticides. Rancid bajra flour is not harmful to useful predators and parasites, and is biofriendly. Farmers who have used this method are happy with the results, but the question is why this method did not become more popular? Farmers who were aware of this method but did not use it said that still they were not confident. They wanted to see more demonstrations. It is difficult for farmers to accept that a cheap method can also be effective. None of the 20 sample non-beneficiaries were aware of use of rancid bajra flour as a bio pesticide. When they were told about the method, approximately 60% farmers expressed their desire to know more about such low cost techniques. They said that since they were not members of Vis but are not beneficiaries of agriculture extension programme informed that since agriculture extension work is not discussed in VI they are not aware of this activity.

#### **Inter cropping of maize with cotton**

Maize seeds are planted between rows of cotton crop for pest control. Maize plants attract bio control agent like lady bird beetle, and lace wing which eat pests of cotton crop. This way the cotton crop is saved from pest attacks, and maize can also be used as fodder. Inter cropping maize with cotton has become quite popular in the area. Fifty eight (90%) sample beneficiaries, out of 65 are using this method. Farmers of neighbouring farms adopted this method after learning from the experience of beneficiary farmers. Six (30%) out of 20 sample non-beneficiaries, have adopted this method and found it useful. The farmers who are using this method expressed their satisfaction. Farmers not using this method were not very much aware of it. In village institutions meetings detailed discussion about this method did not take place. Farmers have to be made aware of this easy method, so that with less effort they can control the major pest cotton.

#### **Organic compost**

Demonstration of use of organic compost in place of chemical fertilizers took place in 1993-94. Every year the number of user farmers and quantity of organic manure has been increasing. A total of 20 (31%) farmers, out of 65 sample farmers are now using organic manure. Looking at the benefits of use of organic manure the farmers started increasing the quantity of organic manure, as compared to chemical fertilizers. In Kherdi a farmer started with 5 bags (50 kg each) of manure; now he uses 50 bags every year. According to the farmers use of organic manure results in less pest attack and increase in productivity of soil. The effect of organic manure is retained in the next year also. Water retention capacity of the land has also increased, and therefore, water requirement has decreased. On the other hand, chemical fertilizers require plenty of water. Also every year the dose has to be increased in order to maintain effectiveness. Farmers using organic manure said that after a year or two they will totally stop using chemical fertilizers.

Organic manure is made by mixing dung and farm waste. It has useful ingredients like tobacco dust, neem cake, castor cake, fish manure, and poultry manure. Use of tobacco dust and neem cake helps to reduce pest attack. For one acre of cotton crop about 1.5 bags (75 kg) of DAP, which costs Rs. 622 and 3 bags (150 kg) of urea costing Rs. 636, are required. The total cost comes to Rs. 1258. If organic manure is used, then for one acre of cotton crop 7 bags (350 kg) of organic manure costing Rs. 900 are required. Thus farmers can save about Rs. 350 per acre. In addition, use of organic manure increases porosity, water retention capacity, and micro nutrients of soil. Farmers informed that organic manure also reduces the effect of soil pests. Reduction in soil pests results in increase in the survival rate of plants, and in turn an increase in plant population, ultimately resulting in an increase in production. Use of organic manure also helps in good germination of seeds. In spite of realizing the benefits of organic manure and the harm done by chemical fertilizers, many farmers continue to use some quantity of chemical fertilizer, as they feel it is important for growth of the plants. Farmers who were interviewed, said that in the first year they reduced DAP by 50 percent but used the same amount of urea. In the second year they reduced DAP by about 75 percent. Along with organic manure, farmers still use urea, as according to them this is necessary for the growth of the plant. Some farmers are confident that, in the long run, constant use of organic manure will increase production better than chemical fertilizer.

Apart from demonstration, AKRSP(I) is also promoting the use of manure by encouraging groups of women to manufacture organic manure as an income generating activity. This activity is only 2 years old, but is meeting with considerable success, after overcoming the initial problem of women's dislike of the smell. In 1996, one women's group in village Hadala took up the activity. In 1998, the village institution of Dhandhalpur came forward to take up the activity. In 1999 this activity was introduced in another two villages (Sokhada and Kherdi) through village institutions. Table 4 shows production of organic manure from 1996-1999. AKRSP(I) staff is hopeful about the wide spread acceptance of organic compost. At present, because the activity is relatively new, the sale is still quite low. The groups are able to produce only enough manure for members of VI's, and that too not completely. Because of this, none of the 20 sample non-beneficiaries received organic compost. As the activity gradually scales up production, the availability of compost to more farmers will increase.

**Table 4: Production of organic manure through village institutions (1996-1999)**

Year	Quantity (in quintals)
1996	50
1997	100
1998	210
1999	1800

Source : AKRSP(I) record

Most farmers are still using chemical fertilizers to a large extent. In fact, interviews with local agriculture input outlets revealed that sale of chemical fertilizers has increased over the last four years in all villages (Table 5), including those where AKRSP(I) works. Vis and AKRSP(I)s own record also reveal an overall increase in the demand for chemical fertilizers among VI members.

**Table 5: Quantity of chemical fertilizer distributed under input supply programme**

Year	Chemical Fertilizer (quintals)	No. of beneficiaries
1994	95	1410
1995	150	2147
1996	230	2525
1997	350	2290
1998	480	1987

Source : Annual Progress Reports, AKRSP(I)

While it would seem that AKRSP(I) is failing to impact on the use of chemical fertilizer through its programme of organic manure demonstration and supply, there are other factors to consider.

AKRSP(I) aims to improve rural livelihoods, and one of the main way to do this is by boosting agricultural production. This is usually best achieved by increasing access to water for irrigation, or crop support watering during periods of rainfall failure. In Surendranagar many water-harvesting structures have been built to recharge the ground water, or to directly provide irrigation. With increase in irrigation, and more crops, and different crops being grown, the demand for more fertilizer, both organic and chemical, is bound to increase. This may be termed "legitimate" increase in use of chemical fertilizers.

The study however could not quantify this type of increase, and therefore it is not possible to say conclusively that overall chemical fertilizer use is increasing in spite of AKRSP(I)'s efforts. However, we need to recognize the aggressive marketing of chemical fertilizers by manufacturers and agents, against AKRSP(I)'s low key and inconsistent campaign for alternatives. In fact many Vis actively promotes sale of chemical fertilizers to members, as they get one of their few sources of income from this activity. Without such activity their survival and sustainability would be weakened. Such tensions between conflicting needs of different parts of AKRSP(I)s programmes need to be recognized.

It is likely that if organic manure was available in sufficient quantity, Vis would promote the sale of this to members and non-members alike. But the current rate of production is still too low to act as an effective alternative. The growth of production within two years is impressive, but scaling up remains a challenge for AKRSP(I).

Overall, while the use of chemical fertilizers, to some extent is seen as legitimate by the organization, it is reasonable to assume that aggressive marketing, along with deficiency in supply of an alternative, is leading to an excessive use of chemical fertilizers.

### **Improved varieties of seeds**

AKRSP(I) has given demonstrations of improved varieties of seeds of bajra, cotton, brinjal, potato, ginger, paddy, tomato, and radish. Out of 65 sample beneficiary farmers, only 16 (25%) have adopted one or two of the improved seeds. None of the sample non-beneficiaries have used these seeds. Farmers reported good response of improved seeds to the local climate, but there is a problem of availability of seeds in time. They said that it is very important to ensure regular and assured supply of seeds. Owing to untimely or even lack of supply, even if farmers want to adopt these new inputs, they are not able to do so.

### **Drip Irrigation**

Drip irrigation was introduced in five villages in 1996 and seven farmers adopted the technique. In 1997 eleven more farmers adopted the system. In 1998 another 17 farmers came forward to adopt it. At present 35 farmers are using the drip irrigation technique. In 1996-97 the cost of the system was Rs. 40,000 per hectare and the government subsidy was 66.6%, and AKRSP(I)'s contribution was 8.4%(Rs.3360) in 1998 the government decreased the subsidy to 55%.

We interviewed nine farmers who had adopted the drip irrigation technique. According to them a drought prone area like Surendranagar, the advantage of this system is quite high since it saves water and irrigates a large area with less amount of water. It increases the rate of germination, and in turn increases production. In spite of so many benefits from drip irrigation, the rate of adoption is very low. The main reasons for the low rate of adoption are: high cost of the system, difficulty in handling long pipe lines, pipe line getting blocked after

some time, even after using a filter, pipes getting stolen, and rats damaging the pipe. The main reason however is the decreased subsidy (from 66.6% to 55%) which has further

increased the financial burden on farmers. The system proves expensive even for better off farmers. Drip irrigation, as a technique is very useful in the area but the present system is very expensive. There needs to be some experimentation in the system to replace expensive parts with locally available raw materials.

### **Horticulture**

Farmers are positive about growing trees on the boundary of their fields. Wherever irrigation facility is available the survival rate is good, but on rain fed land it is difficult to keep the plants alive in summer.

Horticulture activity was introduced in 1997 in the Surendranagar area. People are given saplings of fruit trees like mango, lemon, custard apple and chikoo (sapota). A total of 10 beneficiary farmers were interviewed. Each farmer was given 20-25 saplings during this period for a nominal charge of Rs. 2 per sapling. Survival rate of saplings is about 80 percent. Farmers expressed their satisfaction with this programme, but they would like agricultural extension staff to make frequent visits to monitor the growth of their plants in the initial stages, to guide them about growth and care of plants. Farmers are expecting a lot from this programme. According to them horticulture crops give more income than other crops. In the initial stages proper care has to be taken but once trees are mature then with a little care, farmers can have a regular income for a period of fifteen to twenty years. Farmers said that their expenditure on fertilizers and pesticides will go down and additionally leaves falling from the trees will work as manure and help increase land fertility. In 1997, saplings of fruit trees were distributed to 167 farmers, in 1998 another 52 farmers came forward. Till now a total of 3694 fruit tree saplings have been distributed in 15 villages. On average 14 households are covered from each village. It may be advisable to focus on less villages with more intensity, in terms of coverage of households. The sample non-beneficiary farmers were not aware of horticulture programme of AKRSP, but said that if they got an opportunity they would like to plant saplings of fruit trees like custard apple and pomegranate.

### **Participation of Women**

If women are not involved in the agriculture programme, half of the efforts will go waste. Women are equal participants in agricultural activities. More than 60 percent of the farm work is carried out by women and many agricultural operations are solely carried out by them. Since women are actively involved in agricultural activities, they can contribute effectively to the decision making process. It is very important that women should also be approached while carrying out agriculture extension activities. Often agriculture staff and extension volunteer are men and it is natural that they will contact men for extension work. All 18 agriculture extension volunteers working in the Surendranagar programme area of AKRSP(I) are men. The social environment in the Surendranagar area is very conservative, where women do not discuss anything openly with their men. In this situation women do not get an opportunity to acquire knowledge about new agricultural techniques. For increasing participation of rural women in agriculture activities, it is essential to select some women as extension volunteers, who can communicate comfortably with rural women.

New techniques for some operation like sowing, weeding, harvesting, and preservation of grains, which are traditionally carried out by women are often targeted at men. If men and women are both involved in agriculture extension work, the chances are that the technology will be adopted at the family level with greater understanding. In some agriculture programmes of AKRSP(I) involvement of women is quite significant. But in exposure visits and training programmes (field days, class room training), involvement of women was as low as only 10%. Table 6 shows that participation of women in exposure visits and training programmes did not increase over the last five years. The reason is that the Surendranagar area is conservative, and therefore it is difficult to get these women to participate in training

programmes along with men. There is a need to design separate training programmes for women and, at the same time, empower women over a period of time so that they can participate equally with men. We also observed that it is difficult for women to leave their

young children at home and attend training programmes or go on exposure visits and special arrangements for them may have to be made.

**Table 6: Participation of men and women in exposure visits and training programmes**

Year	No. of Male Participants	No. of Female Participants	Total
1994	258 (89%)	28 (11%)	258
1995	210 (88%)	43 (12%)	353
1996	240 (87%)	32 (13%)	250
1997	455 (93%)	35 (7%)	490
1998	491 (90%)	53 (10%)	544
<b>Total</b>	<b>1654 (90%)</b>	<b>191 (10%)</b>	<b>1895</b>

Source : AKRSP(I) record

## CONCLUSION

The study shows that the quality of agriculture techniques introduced is very good, and most of them are according to the people's need. The main problem is that the spread effect is very low. Farmers who are directly involved in agriculture extension through demonstration and training are making effective use of the knowledge. The rate of adoption by other member farmers is very low. In this situation we cannot expect farmers from other villages to come forward to adopt the new technology. There is need to use communication materials more effectively to reach the maximum number of people. Existing formal and informal groups should be used for diffusion of information. AKRSP formed village institutions should be more effectively involved with the agriculture programmes. Village institutions meetings can be used as a platform for sharing new agricultural technologies with villagers. Village institutions' input supply programme can be linked with agriculture demonstrations. Availability of inputs needs to be scaled up and improved. Exposure visits needs to be designed more carefully, according to People's need, and to areas having similar problems. As farmers find it difficult to remember the content of the training programme, it is advisable to develop training materials in simple local language. Serious attempts have to be made to involve women in the mainstream programme, by holding separate meetings, demonstrations, training programmes, and at the same time empowering them to participate actively in the presence of men.

The agriculture programme is very important in order to bring about a balanced, environment friendly, and equity oriented development. In rural areas low-cost, biofriendly techniques are the means to bring this about. Agriculture plays a pivotal role in rural development, and AKRSP is working positively in this direction.

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