AKRSP(I)'s Experiences in Promoting Micro Irrigation Devices in Saurashtra, Gujarat

Apoorva Oza, Kirit Jasani & Shailesh Dungrani
Aga Khan Rural Support Programme (India)
AKRSP(I) a profile

PROGRAMME AREAS
AKRSP(I) is currently active in four distinct environmentally challenged and economically vulnerable regions of Gujarat. From 2004, AKRSP(I) shall also be beginning work in Madhya Pradesh.

**Bharuch/Surat/Narmada districts** - Netrang field office:
- A socially homogenous tribal society
- One of the poorest blocks in the state.
- Good natural resource base but undermanaged.

**Junagadh district** - Gadu field office:
- A multi caste society
- Large number of commercial farmers.
- Over exploitation of the rich natural resource base has led to serious degradation.

**Surendranagar district** - Sayla field office:
- Conflict-ridden due to a feudal, multi-caste society.
- Poor natural resource base.
- Frequently subject to drought.

**Kutch:**
- A Training and Capacity Building unit has been set up to address the capacity building needs of small and big NGOs, which are in operation in Kutch and are implementing Drought Proofing Projects.
- At Anjar, along with other AKDN agencies working on health and education, AKRSP(I) is implementing a drought proofing project in 9 villages.

**Madhya Pradesh:**
- The focus in MP would initially be in the Nimar region.
AKRSP(I)’s Experiences in Promoting Micro Irrigation Devices in Saurashtra, Gujarat

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Shailesh Dungrani

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Preface

In the early 1980s and 1990s ground water based irrigation was the major ‘driver’ of agricultural growth throughout India especially in areas where canal irrigation was not available. In Gujarat, Saurashtra and north Gujarat regions show a huge increase in the number of dug wells and tube wells. However, by mid 90s this strategy was found to be unsustainable as ground water levels plummeted and water quality became affected. Coastal salinity ingress and ground water depletion became a major crisis in Junagadh district where AKRSP(I) has been working since 1987. AKRSP(I) found that water harvesting was becoming a zero sum game as farmers quickly used the increased water available due to recharge, to increase the area under irrigation. If ground water management was to be successful, just harvesting more water and increasing the supply could not be an answer and demand for water would also have to be reduced.

Since the basic livelihood of farmers depend upon ground water use unless they earn the same or more money with less use of water they are not likely to adopt any steps to reduce groundwater use. Hence for AKRSP(I) it was essential to first show that the same or higher productivity could be achieved through lesser use of water. For this experimenting and piloting the use of water efficient use devices like drip and sprinklers was the first step. However, this is a programme which is still dependent on subsidy by an external agency. Though the subsidy is much less than that provided by the government, scaling up of this approach remains a question. We believe that there are two ways in which scaling up can occur:

• The state has substantial financial resources and the desire to promote micro irrigation systems. It has been proactive in trying to learn from countries like Israel. However, funds used have been ineffective for promoting micro irrigation devices because of a poor extension system and a faulty subsidy policy (subsidizing private companies directly). If AKRSP(I) can induce policy changes based on this experience and the State develops appropriate programmes to support this expansion, much can happen.
• AKRSP(I) and the village entrepreneurs, as they go ahead, increasingly access a non subsidy based approach (loans, payment through installments etc.) so that over a period of time the subsidy does not become a constraint towards large scale expansion.

Though much work needs to be done we are sharing our experiences because we believe that a lot more focus needs to be given by all organizations who work on irrigation, towards the use of micro irrigation devices. We think that the lessons we learnt during the last three years may be of some use to other development actors also.

This study has been co-authored by my colleagues, Shailesh Dungrani and Kirit Jasani. We would like to acknowledge the support provided by all AKRSP(I) colleagues in finalizing this paper. We would also like to acknowledge our debt to Vaibhav Bhamoriya of the IWMI TATA programme, but for whose reminders and support, this paper would have never been written!

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\text{Apoorva Oza}
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\\text{Chief Executive Officer}
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Background

AKRSP(I)’s work in the semi arid regions of Saurashtra, Gujarat had largely focussed on water harvesting through percolation tanks, checkdams etc.

However field experiences showed that with an increasing population there was no way that supply could always meet the growing demand. In most villages, farmers increased the area under irrigation after constructing water harvesting structures, and hence, water levels came down to the earlier levels. Salinity levels, which had come down, returned and in fact increased as extraction increased. Hence, by 2000-01, the organisation felt that there was a need to focus on groundwater management as a whole rather than just promoting community managed water harvesting structures.

In Junagadh district, where groundwater overuse was very high AKRSP(I) decided to pilot groundwater management with two inter-related objectives:

1) Revive the Meghal river, which had become dry, by working on groundwater management with the communities in the 64 villages of Malia block which were part of the river basin.
2) Arrest salinity ingress along the coast in Mangrol Block, where groundwater overuse was leading to increased ingress annually. State efforts had only focused on increasing freshwater supply through large dams, tidal regulators etc which had proved inadequate and villagers were facing shortage of non-saline drinking water.

Promoting the use of water use efficiency devices

AKRSP(I) looked at various options to reduce the water use in agriculture, which included promoting crops that use less amount of water, appropriate agronomic practices and promoting the use of water use efficiency devices like drip and sprinklers.

AKRSP(I) felt that farmers would be willing to explore options where the current agricultural income would remain the same or increase and where they could see an immediate result in terms of water saving and/or increased productivity.

Research and field trails showed that the most substantial savings in water end use is through water efficiency devices like drip and sprinklers. It is aware that mere use of such devices by farmers does not reduce groundwater extraction, as the water saved is used to irrigate a larger area and earn more income. However it feels that if there is widespread adoption of drip and sprinkler for most crops, and it not only saves water but increases productivity, most farmers will adopt these systems for their entire farms (for good and bad years), leading to an overall decline in extraction.

Micro-irrigation device use practices in 2000-01

The use of drip and sprinkler in Junagadh was low and only found in Talala block where there were many mango orchards. Many farmers who had accessed sprinklers on subsidy were merely using the pipes for conveyance.

Our analysis was that the major reason for this low coverage was a subsidy policy that leads to extremely high cost of drip and sprinkler devices and an extension approach which is not user friendly but technology intensive. Private companies who are provided subsidy by the government upto 60% of the total cost produce drip devices in India. Since farmers have to bear only 40% of the cost and the subsidy provides a regular source of income for the drip companies there has been little

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1 This policy has been changed recently in Gujarat
effort to reduce costs. Because of this there has been no market incentive to improve efficiency and quality and reduce costs. Since government subsidy is involved, farmers have to go through a time consuming procedures before receiving a subsidized drip system, and the delay in finally getting the system dampens demand. Additionally because government funding is limited, targets for drip and sprinkler sets are allocated on a district basis. These targets are much less than the potential and therefore the spread of these devices is largely limited. After the farmers goes through the government procedures and gets a set allocated, the technical staff of the drip company make a visit to the farm and do a detailed survey and install the drip. Most of this is done in a manner wherein the farmer feels technically inadequate to replace or reused the installed system. If anything goes wrong the farmer has to call back the company person and get it repaired. This causes delay and therefore only well off, well connected and risk-taking farmers adopt these systems.

AKRSP(I) reflected on the inherent weaknesses of this approach and felt that the only hope for large-scale extension was to look for alternate low cost drip system which was user-friendly. Fortunately the International Development Enterprise (IDE) an NGO which works on low cost technical solutions for the poor, had been experimenting with low cost drips in Rajasthan, Gujarat and Maharashtra. AKRSP (I) could access these system and worked out an informal collaboration with IDE. The Micro tube based system has a total cost of Rs.12000-Rs.16000 per hectare, compared to the Rs 40000/ hectare cost of the conventional dripper based system. A major technology change in the IDE drip was the use of micro tubes vis-à-vis drippers. In saline areas, farmers had experienced that the salt gets deposited in the dripper and chokes the system. It was difficult to open and clean the dripper on a regular basis. In addition IDE uses material which was available in the market(and therefore cheaper) and also promotes villagers or local entrepreneurs to do the assembly work which has made it technically very simple. This system was user friendly and flexible and therefore installation and repairs by farmers on their own was feasible.

However, IDE promotes bucket and drum kit systems only which are useful on small size garden or vegetable plots. Since AKRSP (I)’s main objective is groundwater management, it was interested in using this technology for large farm sizes and crops like groundnut, banana etc which are the main groundwater guzzlers in Junagadh.

Therefore, AKRSP (I) has set up its own system of extension and financial support which is described in this paper.

Status of AKRSP(I)’s programme on drip and sprinkler promotion in Junagadh

Total area covered under micro irrigation

- Over the last 2 years, AKRSP(I) has covered 262 farmers irrigating 208 hectares with micro-tube based drip systems in 37 villages.(see Annexure1)
- AKRSP(I) provides a subsidy for the micro-tube drip system, which was 50% of the cost in 2002 and 33% in 2003. The total subsidy provided in the 2 years is Rs10.75 lakhs for 208 hectares (Rs5168/hectare) and 262 farmers (Rs 4103/farmer). Farmers pay about Rs10600/hectare and Rs 7500-8000/farmer.
For drumkit ,bucket and easy drip/tape, AKRSP(I) provides no subsidy. About 300 drumkits have been promoted in this area while 20 farmers have tried out easy tape for groundnut castor, pigeonpea and papaya so far.

Farmers are increasing adopting a hybrid system wherein they use the main material from the conventional, government subsidized drip system which was lying idle but replace the drippers with micro-tube. About 30-40 farmers are now reviving their drip systems through this hybridization. These farmers just buy the micro-tubes from the assembler and get them to install the new system. No subsidy is given here.

Sprinklers sets(5 sprinklers to a set) have been adopted by 1500 farmers, largely for support irrigation in Groundnut. Sprinklers are also subsidized upto 50 and 33%.

Though 2002 was a low rainfall year where motivation could be easier, the adoption rates have increased in 2003 even though it is a good monsoon year. Most farmers using drip in sprinkler in 2002 have continued use in 2003.

Drips have been tried out successfully for almost the entire range of crops grown in the area(see Annexure 2) This includes a recent experiment of using drip for pre-monsoon sowing of groundnut, the major crop in the area.(see annexure 3)27 farmers in 3 vilages have irrigated 30 hectares of land. Wheat irrigation on 2 bhigas(0.3 hectares) also seems to be working out well.

Studies done by AKRSP(I) staff show water savings of about 65-80% and increased productivity in many crops.

Recently fertigation is also being tried out with farmers adding liquid fertiliser to the water.

AKRSP(I) has 2 agriculture graduates working on this programme(one in each block) supported by village level Extension Workers (EW’s) who are paid an incentive of Rs200/hectare for motivation, aftercare etc.

AKRSP(I) has been able to cover a total of 208 hectares and 262 farmers in 37 villages of 2 blocks at a cost of Rs4100/hectare (comparatively the government in 2002-03 has covered 526 farmers at a total cost of Rs.272 lakhs,i.e.Rs43000/hectare)in the district of Junagadh.

Micro-Irrigation extension system in Junagadh: The beginning

When IDE wanted to initiate work in Talala, AKRSP(I) suggested P.C. Karia as an assembler. P.C.Karia was the secretary of the village organisation in Hiranvel village and been an effective extension agent of biogas programme promoted by AKRSP(I).Karia after getting training from IDE, was a successful assembler and became a key part of IDE’s work there. He earned good money as incentive and soon became a model for others in the area, as he started employing fitters also. Because the first assembler was a person of credibility, the technology could spread fast and farmers were willing to pilot the new technology. Thus the choice of P.C.Karia and his training by IDE proved critical to the eventual success of the “villager as an assembler/entrepreneur” model, even though he focused only on the bucket drip technology.

Structure Of Assembler / EV Model For Drip System

AKRSP(I) has promoted drip for farmers in the saline block of Mangrol and the non-saline block of Malia. The extension system set up is as below:
The role of the various players is given below:-

1. **AKRSP(I)**
   - Provides training and exposure for farmers, assemblers, extension worker fitters etc
   - Finalizes the rate of material with assembler.
   - Received bills of drip system from farmer and disburses subsidy after on field investigation
   - Solves technical problems as and when required

2. **Extension Worker(usually a village youth with basic education and good communication skills and credibility)**
   - Motivation of farmers, demand collection and submission of farmers list to AKRSP(I).
   - Acts as a link between the farmer and the assembler, as well as farmer and AKRSP(I).
   - Plays a regulatory role, prevents collusion between assembler and farmer (through correct reporting of material), hence is present during fitting. He represents AKRSP(I) at site, checking to ensure no misuse of subsidy.
   - When there is no subsidy, (as in easy tape) then is hired by assembler as motivator and sales agent.
   - Gets an incentive of Rs200/hectare from AKRSP(I).
   - Does the follow up and aftercare after the system is installed, and in case of field problems, gets in touch with fitter/assembler for rectification.

3. **Assembler/entrepreneur(selected from the EW’s, basic education and financial skills, willingness to take the risk of running a business)**
   - Purchase material on credit from m/s. Ambica or any other supplier.
   - Hires a fitter / worker on daily wages and trains him in survey and estimation, fitting etc.
   - Collects demand from AKRSP (I), EW, sometimes farmers directly.
   - Survey & estimate preparation for farmer.
   - Installation, bill preparation, recovery of amount from farmers.
   - Preparation of documents related to the drip system.
   - Submission of all bills to AKRSP(I) block offices.
   - Assembler adds his commission (10%) to the material costs charged to the farmer. Thus on a turnover of about 5-6 lakhs, makes an income of rs40-50,000/-. He also makes payment to the fitters he hires on a daily wages.
   - Negotiate with suppliers for better and cheaper material.

4. **Fitters(local youth, not educated ):**
   - They do the installation work, get payment for the same from assembler.
   - AKRSP(I) provides training to them on basic knowledge of the system.

5. **Ambica / producer company :**
   - Supply material to assembler on credit.
   - Submission of price list to AKRSP(I).

6. **Farmers :**
   - User
   - Motivator for others
   - Innovation in terms of use for different crops

1) AKRSP(I) staff plays a major role in motivating farmers for experimenting with drip, and in the initial stages played a very key role. There is a great focus on trying out drip with different crops, and to show that this technology could be applied to almost all the crops grown in the area and was not restricted to orchard crops.

2) For each village AKRSP would identify an Extension Worker(a village youth with interest in agriculture, basic literacy, good communication skills and a lower economic status (desire to earn money). This person was initially placed as a fitter with P.C. Karia who trained him in installation, motivation etc.
3) One of the EW’s who is good at his work and fits the criteria (see annexure 4) is invited to be an assembler by AKRSP(I). The assembler purchases the material from the supplier on credit, employs the fitters and then gets the sets installed on the farmers field based on the demand collected from the EW’s and AKRSP(I).

4) AKRSP(I) provides a subsidy of its own. This was necessary despite the lower cost of the micro-tube drip (vis-à-vis the conventional drip) because farmers were used to a subsidy from the state and were willing to wait for their turn to get this subsidy rather than opt for a no-subsidy option. Also, though the government system had 40% contribution from the farmer, in actual terms farmers and the company came to an agreement wherein they paid much less.

In 2002 AKRSP(I) subsidized 50% of the cost of the system and in 2003, it provided 33% subsidy (up to a maximum of Rs4000/farmer). The farmer buys material (worth Rs5000/- for one hectare of mango etc) directly from the market, while the assembler supplies material and gets the set installed on the field by the fitter. For a total cost of Rs12000/-, he should get Rs7000/- from the farmer. He collects Rs3000/- plus a voucher signed for the remaining material (worth Rs4000/-). This material is checked by the Extension worker and staff at the field and assembler is paid the amount against the voucher. The Assembler’s margin is included in the material costs charged to the farmer.

5) Since the assembler is a person of modest means, the supplier (Ambica company, the dealer identified by IDE was the initial supplier) would not give him material on credit. Hence AKRSP(I) stands as guarantor so that the assembler could access material on credit. Gradually the assembler now deals with the company directly, and with help from AKRSP(I) has also identified cheaper suppliers with whom he negotiates directly.

**Generic learning lessons from AKRSP(I)’s experiences**

The last 2 years have provided many learning lessons to the organisation. The key lessons are summarized below:

1. **The need for constant innovation**

   AKRSP(I) found that every crop requires a different type of application of the technology and therefore there has to be flexibility available to innovate based on the farmer specific conditions and needs. For example, there are many farmers who had purchased government subsidised drip earlier, these farmers do not purchase the whole drip set but only the micro tube and the village extension workers help them install this hybrid system. Similarly in Mangrol experiments showed instead of using the micro tube if the water cock is used it is cheaper by Rs.7/coconut tree and hence many farmers are demanding cocks instead of micro tubes. Farmers have been encouraged to innovate and therefore cheaper filters have been developed compared to those supplied by IDE (which in itself is much cheaper than that supplied by government). Plastic Pegs for the tubes have been replaced by cheaper wire pegs.

2. **Focus on reducing cost**

   Throughout these 3 years AKRSP(I) has realized that farmers, like all consumers, do not like to pay more and the less amount they have to pay the easier it is to extend the technology. The study by an IRMA student show that cost is a major deterrent for adoption of drips by farmers. Hence because of this continuous focus on reduced cost, innovations have come up and assemblers, extension volunteers and farmers all strive hard to reduce cost. Another way actual costs have been reduced by AKRSP(I) is by promoting competition amongst suppliers. So instead of buying

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2 “Enhancing Entrepreneurship in Micro-Irrigation, mainly in Drip Irrigation” by Sudarsan Panda, an Organisational Trainee from IRMA.
through the major supplier Ambica Agencies, the companies who supply to Ambica were also contacted and negotiations were done by the assembler and AKRSP(I) staff to reduce cost and get better prices.

3. **Balancing cost vis-à-vis technical perfection**

When a scientist from the Agricultural University were shown the drip installed for beetle wine and other crops they felt that the lay out were not done perfectly and therefore the amount of water at the last plant was not the same as at the initial plants. Because of this the productivity would be effected and this was not therefore a good drip system. However our estimation was that this 10% decrease in water available was more than compensated by the fact that the cost of the systems we had installed was at least 20% less than what a perfect technical system would have cost. Farmers, especially when they are trying out a new technology, are fairly cost sensitive and do not mind foregoing some perfection if it reduces its cost.

4. **Drawback of a Standard unit costs**

Most of the government systems in their effort to have a standard unit cost have hectare as a unit of allotment. In fact in Junagadh the government does not promote drip for beetle wine etc. because it requires high density and the cost per hectare is very high which does not fit into the standard norms of the government. For Sappota and Mango the cost is Rs.12,000 per hectare which cover 100-150 plants while with the same cost, only half hectare is covered in banana (700 plants), 0.75 hectare in coconut (130 trees) and (0.3 hectares) 2 bhigas in beetle wine. This is because the spacing is different. In fact the economic unit is also different. Hence it is essential that costs be developed for each crop.

5. **The eternal dilemma: to subsidise or not?**

The major concern for most development agencies who promote micro irrigation is the need to make this whole technology less dependent on subsidy and therefore sustainable with market forces. There have also been some successes in promoting drip without subsidy. However for AKRSP(I) the major reason of promoting drip technology is to reduce the use of ground water overall and therefore large scale and intensive adoption of drip is essential. We have found that farmers are extremely aware that government is offering subsidy and therefore if one talks of the project without subsidy, even at a reduced cost, the adaptors are few and mainly the better off farmers and risk takers. On the other hand our experience for the last two years shows that if gradually subsidy is reduced then the rate of adoption is much faster. For example, initially on micro tube AKRSP(I) provided 50% subsidy and in the year 2002 it has covered 112 farmers, in the year 2003 subsidy was reduced to 33% and yet the number of farmers went up to 139 farmers. We believe that currently drip is yet at experimental stage for most farmers and for most crops. And therefore like any experiment it needs to go through a period of risk support before farmers will be willing to invest on it on their own. It would be useful to remember that initially even wells and chemical fertilizers had a subsidy component before they were adopted on a large scale by farmers. For extremely low cost technology like drum kit and easy tape AKRSP(I) does not provide any subsidy.

6. **Extension approaches**

AKRSP(I) has found that a range of extension methodologies have to be tried out to get farmers to adapt this new technology. So in addition to village level extension work farmers are taken on exposure visits and field days to visit other farmers who are the initial adopters. Targeted training have been held in which irrigated farmers are been invited sometimes with a letter on their name. This ensures high attendance and higher adoption.
7. Because drip is a part of groundwater management approach promoted by AKRSP(I) Padayatra have been more useful for spreading messages of drip across the villages. The fact that drip is a part of water management strategy has helped in the extension. Because farmers are concerned about declining ground water levels and increasing salinity levels and the fact that even in good rainfall years there is not enough water in the wells they are looking for answers. A drip system when it is discussed in conjunction with water harvesting structures makes sense for them. In many cases farmers have contributed substantially towards water harvesting structures and therefore agree with the need to use that harvested water more efficiently.

8. **Experimenting on different crops**

As can be seen from the Annexure 2, AKRSP(I) has tried out the micro drip on a range of crops and through this exploded the myth that drip can only be applied for horticulture crops. Because of this, for example, in coastal saline areas almost all the beetle wine farmers have gone in for drip. Recent experiments show that drip can be applied for pre-monsoon groundwater sowing which has a wide application as most farmers grow groundnut. (Annexure-3).

9. **Speed of response**

There is a peak period when farmers are willing to adopt drip, largely during the summer months of March and April. AKRSP(I) starts the extension work from February. However since farmers usually wake up at the last moment it is essential that the gap between demand and installation is as less as possible. The assemblers and extension volunteer manage to do this in about 7-10 days and hence the farmers see the impact immediately. Feedback from farmers reveals that the delayed response in the government system is a major reason why farmers don’t go in for this technology.

10. **Aftercare**

Because it is a new technology it is essential that there be visits to ensure that the technology is working fine and to support the farmer in case he faces any problem. Because the extension worker belongs to the same village and the farmer has got the drip installed through him the farmer considers it the extension worker’s duty to provide aftercare. This pressure ensures that the extension worker as well as the assembler do visit the farmer after installation. Of course the fact that compared to drip systems the micro tube is user friendly technically makes a huge difference and in most cases farmers can solve the initial technical problems that they face.

11. **Incentives**

As has been mentioned in the paper the assembler makes money through the material he charges as he adds the mark up of about 10% to the material cost. Hence on a turn over of about Rs. 4-5 lakhs he makes Rs.40,000-Rs.50,000/- which is reasonably good amount for 4-5 months work. However the extension worker gets an incentive from AKRSP(I). The reason this is being done is because in a way he plays the role of checking whether the area claimed by the assembler and farmer matches with that on the field. This is essential because currently AKRSP(I) is paying 33% subsidy and by inflating the figure the assembler and farmers could come to an understanding and cheat AKRSP(I). Over a period of time the extension worker could be paid by any institution which plays a regulatory role i.e. village committee etc. The EW also listens to AKRSP(I) on after care etc. because he is paid incentive by AKRSP(I). In the initial stage quality control is important and there are not enough competition in the market to enforce quality. If the assembler was to pay the extension worker then he would be far more interested in achieving higher turnover and may not prioritize aftercare. This may lead to a high failure and eventually low credibility of the technology. Hence in the initial stage the incentive to the extension worker is paid by AKRSP(I).
**ANNEXURE-1**

**DRIP IRRIGATION IN AKRSP(I)**

<table>
<thead>
<tr>
<th></th>
<th>Maliya</th>
<th>Mangrol (saline coast)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of farmers</td>
<td>119</td>
<td>143</td>
<td>262</td>
</tr>
<tr>
<td>Area (hectares)</td>
<td>95.22*</td>
<td>113.09</td>
<td>208.31</td>
</tr>
<tr>
<td>No. of villages</td>
<td>19</td>
<td>18</td>
<td>37</td>
</tr>
</tbody>
</table>

* Support irrigation for groundnut has provided through a combination of micro-tube and easy tape on 30 hectares of land covering 27 farmers.
* Wheat irrigation is being experimented on 0.30 hectares (2 bhigas) with easy tape.

**ANNEXURE-2**

**Using DRIP in different crops**

<table>
<thead>
<tr>
<th></th>
<th>MANGROL (in hectares)</th>
<th>MALIYA (in hectares)</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sapota (chikoo)</td>
<td>18.10</td>
<td>1.92</td>
<td>20.02</td>
</tr>
<tr>
<td>Beetle wine</td>
<td>24.00</td>
<td>4.3</td>
<td>28.3</td>
</tr>
<tr>
<td>Banana</td>
<td>34.5</td>
<td>13.5</td>
<td>48.0</td>
</tr>
<tr>
<td>Coconut</td>
<td>24.00</td>
<td>3.6</td>
<td>27.6</td>
</tr>
<tr>
<td>Vegetable</td>
<td>4.55</td>
<td>5.4</td>
<td>9.95</td>
</tr>
<tr>
<td>Mango</td>
<td>2.25</td>
<td>33.95</td>
<td>36.20</td>
</tr>
<tr>
<td>Garden</td>
<td>2.75</td>
<td>—</td>
<td>2.75</td>
</tr>
<tr>
<td>Rose</td>
<td>1.07</td>
<td>0.5</td>
<td>1.57</td>
</tr>
<tr>
<td>Drumstick</td>
<td>1.00</td>
<td>—</td>
<td>1.00</td>
</tr>
<tr>
<td>Other</td>
<td>0.90</td>
<td>0.40</td>
<td>0.90</td>
</tr>
<tr>
<td>Lemon</td>
<td></td>
<td>0.40</td>
<td></td>
</tr>
<tr>
<td>Water melon</td>
<td></td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Custard apple</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Groundnut</td>
<td></td>
<td>30.0</td>
<td>30</td>
</tr>
</tbody>
</table>
**Pre monsoon sowing of groundnut**

Pre monsoon sowing of groundnut is carried out during the second fortnight of May whereas regular monsoon start during second fortnight of June. By this time most irrigation wells are either dried up or have little water during the month of May. Pre monsoon sowing is practiced in the area through flood irrigation wherever water is available. The logic is as sowing is done in advance, less water is required during the dry spells in the monsoon. In addition to this, it also helps in pest control which occur during various stages of ground development. Along with this due to early sowing, the crop is harvested earlier which results in better market price as it is a cash crop.

Hence looking at the various advantages of drip system it is now being adopted by increased number of farmers who have little water in their wells for pre-monsoon groundnut by traditional means. Moreover, the drip system is designed in such a way that it could initially be installed on 0.16 hectare area of groundnut, and then it can be shifted to rest of the area to be irrigated. This design not only reduces the cost of the system, but also allows farmer to increase the area depending upon the availability of water in the well.

**Some key benefits of pre-monsoon sowing by drip**

**Increase in Production**

However a study showed that the groundnut production cultivated through monsoon is about 360-400 Kg./Vigha whereas pre-monsoon farmers got an increased production of about 500-540 Kg./Vigha.

**Market Value Increase**

Market value of a cash crop generally depend upon the quality of the crop along with timely availability of the same. Pre monsoon groundnut gives good quality crop and according to the farmers they get about 10% increased market value as compared to monsoon groundnut.

The main reasons for increased market value are:

1. Crop comes early to the market as compared to monsoon groundnut so at that time market is high.
2. As per farmer’s opinion, the kernel to pod ratio is better.

**Time saving**

Traditionally in pre monsoon sowing, firstly water is applied to the field following this the seed is sown in the wet field. It is difficult for the farmer to sow the groundnut in wet field; along with this the time and water required is more. In drip method of pre monsoon sowing, first the ground-
nut seed is sown in the dry field and then it is irrigated, so less time is required for sowing as the field is dry and is easy for the farmers. along with this water required is less. According to the table the time required is just the double in both the case.

Table-1 shows the comparison of Both the System for Time Requirement for Sowing and Irrigation.

**Table 1**

<table>
<thead>
<tr>
<th>Phases</th>
<th>Time required by Drip Irrigation Method (Hour)</th>
<th>Time required by Traditional Irrigation Method (Hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sowing</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Irrigation</td>
<td>2.5</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Analyzing the questionnaire and through group discussions.

**Less Seed Requirement for Sowing**
As it is easy to sow the groundnut by drip irrigation method due to the dry field so with time and water saving the seed required is also decreased as compared to traditional method. Around 25 Kg/Vigha seed is required by traditional system whereas about 20 Kg/Vigha seed required by drip method.

**Weed control**
Weeding is a major problem in groundnut and other crop. As per farmers opinion less labour is requirement for weeding by this system. About Rs. 100-150 /Vigha cost reduction is observed, hence reducing the total cost of cultivation.
ANNEXURE-4
Assembler Selection Process

Some of the criteria for Selection of the Assembler/Entrepreneur are as follows:

1. Integrity: S/He should have credibility in the area
2. Should be able to read and write, and have some skills in doing financial calculations
3. Should have good communication skills, an extrovert personality
4. Should not be well off and have motivation to work hard.
5. Should be free from family /social responsibility.

Assembler is usually selected from the Extension Workers. The selected person is given a clear idea about the Assembler’s work and benefits. If he is ready to do this work, training is given, largely using the IDE training programs.
<table>
<thead>
<tr>
<th>No.</th>
<th>AKRSP(I) Publications</th>
<th>Author</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Credit Systems in Rural Areas: A Study in Bharuch district of Gujarat</td>
<td>Sulbha Khanna, Manoj Mishra, et al</td>
<td>1996</td>
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<td>4</td>
<td>A Path out of Drudgery for Women: A biogas Programme Case study in Junagadh area</td>
<td>Sulbha Khanna, Salima Jethani</td>
<td>1996</td>
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<td>6</td>
<td>Impact Study of Contour Bunding and Land Leveling</td>
<td>Vikas Nath</td>
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<td>Sulbha Khanna</td>
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<td>Niraj Joshi</td>
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<tr>
<td>11</td>
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<td>Nand Kishore Agrawal</td>
<td>1999</td>
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<td>12</td>
<td>Impact Study of Agricultural Extension Programme in Surendranagar Area of AKRSP(I)</td>
<td>Sulbha Khanna</td>
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<tr>
<td>13</td>
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<td>Manoj Mishra, Dinesh P.Mogharia</td>
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<td>14</td>
<td>The role of land classification criteria in ensuring equity</td>
<td>Sulbha Khanna</td>
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<td>Impact of minor canal irrigation projects of AKRSP(I) in Bharuch programme area</td>
<td>Sulbha Khanna</td>
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<tr>
<td>17</td>
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<td>18</td>
<td>Experience of mango plantation: a case study of Katrasa village of Junagadh programme area</td>
<td>Kirit M.Jasani</td>
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</tr>
<tr>
<td>19</td>
<td>Cost Benefit Analysis and Water use efficiency - A case study of Motasakhapar Village</td>
<td>Study Team of AKRSP(I)</td>
<td>2000</td>
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<td>20</td>
<td>Gender and Irrigation in India: The Women’s irrigation group of Jambar, South Gujarat</td>
<td>Barbara van Koppen, Rashmi K.Nagar, Shilpa Vasavada</td>
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<td>21</td>
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<td>22</td>
<td>‘Manavtano Marag’ (in Gujarati)</td>
<td>Published by Charkha supported by AKRSP(I)/ANANDI</td>
<td>2002</td>
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<td>23</td>
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<td>Published by AKRSP(I) / ANANDI</td>
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<td>24</td>
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<td>2003</td>
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<td>27</td>
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The cost of AKRSP(I) Publication is Rs.75/- each within India. Overseas rates are US $5. Handling charges extra.
AKRSP(I)'s Experiences in Promoting Micro Irrigation Devices in Saurashtra, Gujarat

In Junagadh district, where groundwater overuse is very high, AKRSP(I) is piloting groundwater management using various options such as promoting crops that use less amount of water, appropriate agronomic practices and promoting the use of water use efficiency devices like drip and sprinklers.

This paper describes AKRSP(I)'s experiences in promoting micro irrigation devices in two blocks of Junagadh district i.e. (i) the saline block of Mangrol and (ii) the water deficient block of Maliya. We believe some interesting work has been done in using village entrepreneurs to promote micro irrigation devices and it has been demonstrated that drips/sprinklers can be used for almost every crop grown in that area. Hence, many of the myths which were prevalent with farmers and extension workers that drip could not be used for groundnut, wheat etc.; have now been countered.

AGA KHAN RURAL SUPPORT PROGRAMME (INDIA)

Central office
choice premises, swastik crossroad
navrangpura, Ahmedabad 380 009
T 91 79 2642 7729, 2642 7205
F 91 79 2642 0864
E akrspl@icenet.net

registered office
sarojini house, 2nd floor,
6, bhagwandas marg
New Delhi 110 001