



Improvement of Irrigation Water
Management in Lebanon and Jordan
IrWa Project



IRWA PROJECT: METHODOLOGY AND RECOMMENDATIONS TO IMPROVE EXTENSION SERVICES

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Partners

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OVERVIEW

In Jordan, farmers presently do not rely on public extension since it is challenged with major bottlenecks that limit its reliability. Among the major challenges are the following:

- Insufficient logistical facilities,
- low skills of the extension staff,
- unclear job descriptions,
- lack of working methodologies for on-farm follow-up, and
- low motivation of the extension agents.

These factors result in low presence of public extension agents on the field. Farmers instead obtain agricultural information and technical services from personal experience and observation or from the private sector (e.g. seeds companies, commercial vendors of inputs, equipment and materials). The private sector's role as a form of extension service has lately been increasing in importance, since it has been active in providing most of the new agricultural technologies and technical services. It must be noted though, that this private sector form of extension has the tendency to favour capital intensive enterprises and to induce over-use of agricultural inputs, or to provide low skilled farmers with equipments and products of poor quality or performance.

Until mid 2007, the responsibilities of the Ministry of Agriculture (MoA) and the National Centre for Agricultural Research and Technological Transfer (NCARTT) to provide technical assistance (extension services) to farmers overlapped. Since July 2007, the mission of NCARTT was amended and extended to include the extension services previously attributed to the MoA. NCARTT became the National Centre for Agricultural Research and Extension (NCARE). As the expansion of the mission of NCARE implies stronger focus on extension services, the Centre will have to re-orient its professional and financial means to eventually shift from purely fundamental and academic research activities to applied research activities to be able to answer technical constraints encountered by local farmers.

IrWa project organized a workshop in Amman on August 13th 2008 addressed issues related to the participatory approach used with the farmers, achievements and the main recommendations achieved during the implementation of the project. The workshop was held in Arabic and attended by many farmers from the different agricultural areas in Jordan as well as decision makers from NCARE, JVA and MoA and members of foreign missions.

Workshop Presentations:

Workshop agenda includes the following presentations:

1. Project Activities in Jordan and Lebanon including problems and projects' justifications. This included project description, pilot farms selection and assessment, support water user association, organizing training programs, soil testing, defining fertilizers need, ensuring the maintenance of the irrigation networks, developing consultations and exchanging expertise visits between Jordan and Lebanon.



Box 1: Summary of the discussion

In order to guarantee continuous support and interest by other farmers, the project worked with WUA and shared some of the cost with the selected pilot farmers and contracted these farmers to participate by 20% of the cost of the equipment, tools and materials used into local associations. This was to create an incentive for long term interest and continuity between the lead farms, the local associations. Also, there have been some visits exchanged with pilot farms and farmers from Lebanon involved in IrWa to allow for brainstorming and exchange of ideas and experiences. About the purpose of the trash racks that were installed as part of the project, the speaker indicated that the trash rack and coarse size filters were used in main supply lines to eliminate larger debris and contaminants. Finer filters were introduced later to minimize the debris in the water that reaches the farms.

The audiences commented that farmers previously had to inspect and clean the filters frequently because debris used to cause blockage in the main lines (both before and after the pump). With the trash racks and filters installed, the farmers do not have to do that very often. The JVA will add more trash racks and filters in the network to limit the amount of debris reaching the farms.

2. Water saving technology "Soiless Agriculture" demo plot: The presentation described the close soiless system that has been implemented by the project at Deir Allah Research and Extension Regional Centre at Jordan Valley. The system was used to fertigate pepper and been used as a demo site for farmers and interested persons. A manual for installation and management such system in Arabic and English has been produced by the project and distributed to the audiences.

Box 2: Summary of the Discussions:

Regarding the feasibility of the technique and how it does compare with conventional agriculture, the experiment just ended and the data is being processed and will be published soon. However, initial results showed about 30% savings in water and N-fertilizers.

Concerning whom will this model be passed to, considering that most farmers have small plots and this model involves a high overhead cost. Due to the high overhead cost, the model is more appropriate for the larger plot/scale farms. However, most of the cost comes from the computerized control system. To make the model available for small scale/plot farms, NCARE will provide calculated values of water and fertilizers required to substitute for the computerized system.

Comment (audience):

Regarding the system cost:

1. The cost of sterilization often used in conventional methods offsets the cost of the volcanic tuff and other materials used.
2. The cost of the computerized control system is equal to the cost of two labours per year. However, using the control system generally saves the cost of 3 labours per year. Therefore, the savings from using the system offset its cost.
3. In addition, this model eliminates the need for ploughing, weeding and other activities associated with conventional methods.
4. The 30% savings in water used, could actually result in up to 50% savings in fertilizers.
5. The model has a favourable environmental impact

Some farms commented that they have been implementing the model for the past ten years with great water savings.

The answers for questions about the difference between the Red and the Black Tuff, what acids used, and if it is possible to make the results available for farmers were: that acidity in the Black tuff can be washed out faster than that in the Red tuff, and that both, Nitric and Phosphoric acids were used. The results will be available to all through NCARE.

About the kind of follow up needed to ensure smooth operation of the model; the speaker indicated that the common problems were pump failure and clogging. There is a need for frequent inspection of the filtering system to check for clogging. On rare occasions, loss of electric power caused stoppage of pumps and control system. In order to handle parasites and bacteria in the water, the water system is a closed loop system and therefore gets no sun light to encourage growth. Also, using rain water helps lower the risk of infection.

3. Presentation "The fertigation manual" that will be produced by Specialist from NCARE and JUST. This manual that is planned to be supported by the project, will contain; definition of the fertigation process (an integrated process of simultaneous fertilization and irrigation), an overview of the positive aspects of such a system (more efficiency in irrigation and using fertilizers, less pollution risk of underground water, higher productivity, better use of time and labour), the negative aspects of the system

(high initial installation costs, a bad distribution of fertilizers in the soil if the system isn't correctly installed, rust on the metallic parts if not well maintained), the points to be taken into account when using the fertigation system as well as the specifications related to the used fertilizers. The content of the manual will help to guarantee the good management of a fertigation system.

Box 3: Summary of the Discussions:

It was indicated that the analysis and preparation the fertilization program take into consideration the nutrients already existing in the irrigation water and soil and in some cases: there have been more than 30% savings in fertilizers used when the existing nutrients were accounted for.

The audiences indicated: in every irrigation or fertilization system, there is a threshold point after which the extra water or fertilizer used is wasted and could become harmful to the plant(s). Therefore there is a need for a detailed analysis to determine:

- the nutrients in both, soil and water
- the exact needs of the plant(s)
- water movement
- swell/shrinkage in the soil
- varying moisture levels in the air

The manual will discuss this concept and its effect on the overall system efficiency.

Farmers commented that in some cases, farmers achieved 50-60% savings in the cost of fertilizers when preparing the fertilizer mix in-house compared to purchasing ready made mixes; will the manual contain instructions or recipes for preparing the mix? The manual mainly addresses mono fertilizers because they are easier to handle and have a simpler fertilizer equation. Naturally, the fertilizer equation varies according to each stage in the plant's life. The audience hoped that the manual will include information regarding how the plant utilizes the different fertilizer compounds at the different stages of its life.

Also the manual will account for the variation in the concentrations caused by the change in the equipment performance, like pumps, filters... etc.

4. Two presentations about the "IrWa Project Methodology; Principles and Perceptions" and "IrWa Recommendations for better Extension Services".

Working with organized farmers in association was very important and this was the reason for the success of the project because it tackled the real problems in the field and all decisions have been made after discussions and agreements with the farmers. Also, the support of the WUAs will guarantee the sustainability of the project. Regarding the recommendations to improve extension services, the recommendations divided into two levels;



LEVEL 1: INSTITUTIONAL LEVEL: FRAMEWORK WITH A CLEAR MANDATE: The challenge is to establish the extension service of NCARE into one that is decentralised, participatory, pluralistic and sustainable. The new extension service should be responsible of providing **impartial** and **unbiased** technical information using convenient approaches

that correspond to the farmers' technical backgrounds and interests. A clear border should differentiate between fundamental and applied research. However, both services should collaborate and complement one another to come up with applied solutions to farmers' problems. To do so, the both centres should develop competent and efficient human, logistical and financial means.

1.1 Develop specialised services for farmers

The creation of a Research and Development Unit (RDU), in charge of developing applied research in collaboration with NCARE researchers, can create the link between research and extension. In the irrigation domain, the RDU can be the national entity in charge of assessing the quality of irrigation materials, by for example testing the irrigation materials and performance before introducing them to the farms.

Developing **specialised extension services** is necessary for the successful dissemination of the extension research results and recommendations. Besides irrigation, the extension service should address other technical topics (such as marketing, post harvest techniques, IPM and IFM). According to the farmers' needs assessments and taking into account NCARE's and LRA's current human resources and technical skills, four services could be identified:



- **Optimisation of Irrigation** service could provide farmers with technical support to adapt irrigation design and materials with the main aim of improving water use efficiency and irrigation systems durability.
- **Post Harvest and Marketing service** to present new collection, grading and packing methods for fruits and vegetables. A Marketing Unit could test new high-value crops (variety screening) and establishing links between farmers and buyers (local and international) through the organisation of workshops, conferences and field visits.
- **Integrated Pest Management** service to provide farmers with application methodologies, standards, new perspectives (chemical and biological) and security measures that are required for environmental and healthy treatment approaches.
- **Integrated Fertilisation Management** service to use soil laboratory analysis to provide farmers with accurate fertilisation plans that take into account the water and soil mineral contents. Particular attention must be given to develop adapted methodologies while using treated wastewater in agriculture and promote soil conservation.

The Research and Development Unit, in collaboration with researchers, will be in charge of coordination and information exchange between services and consistency in scientific approaches.

1.2 Develop the human resources: Establish a pool of skilled field engineers

IrWa's experience demonstrated that well trained extension agents with adapted tools and clearly defined methodologies were able to answer farmers' irrigation technical problems. Also, an accurate definition of tasks and functions should be set for each service. Field engineers should be objective-oriented (e.g. they should be assigned a minimal number of farmers to follow-up) and regularly evaluated during the season. Provided convenient indicators are defined and agreed upon, financial incentives according to the accomplished results could also increase motivation and improve the agents' willingness and diligence for work. Continuous training for extension agents in their specialisation is another key point.

1.3 Create networking channels and meeting platforms that include farmers

The creation of national forum for coordination, acting as a steering committee, between farmers and other agricultural sector stakeholders (policy makers, universities, NGOs, private firms, donors, etc.) is required to:

- share common objectives and frame policies,
- harmonise working methods and tools,
- capitalise experiences and exchange of information,
- follow up and evaluate activities,
- define research and development priorities and
- centralise training and research facilities.

Cooperation among the different institutions and stakeholders will guarantee the complementarities of their efforts and reduce repetitions and duplication of tasks and responsibilities among them. It will also contribute to mutual understanding, which will finally benefit to the whole sector.

1.4 Assure financial sustainability of extension services

NCARE in Jordan is a government agency that is specifically restricted by its charter from generating its own income. NCARE is nearly exclusively funded by the Jordanian government. At present, 90-95% of NCARE annual budget comes from the Jordanian government and the rest from donors.

NCARE runs six research stations across Jordan, and it controls some proprietary products, and provides services from its laboratories such as soil and water analysis. Last year, in June 2007, a mission from USAID evaluated the work of NCARE they suggested to make NCARE an autonomous body, but this has not yet been implemented.

It is essential that NCARE develops an extension approach that matches its allocated financial resources. Presently, external resources are too often used to implement agricultural extension activities (EU, USAID, World Bank, etc.) and NCARE must find new opportunities to sustain its activities. On the short term, the extension system must be developed in such a way that minimises operating costs and creates funding opportunities generated by the agricultural sector stakeholders (private companies, farmers and retailers, etc).

In an attempt to suggest financial sustainability for NCARE, the following could be proposed:

1.4.1 Increase financial participation by agricultural stakeholders

Direct and indirect financial participation from farmers is an easily foreseeable resource. A direct, annual fee or subscription could be collected from the farmers in return for receiving technical backup from the extension service (field day invitations, participation to trainings, etc.) Other specialised services (such as soil analyses, fertilisation plans and irrigation designs) can also be co-financed with the farmers and offered by the Centre.

Indirect contribution can be shared between farmers and commercial intermediaries using a low value tax (0.01% for research and development for instance). This contribution can be collected at the central markets, which would then be deducted from the already existing 4% shared by the farmers and the trade intermediaries.

1.4.2 Adopt a commercial approach for marketing the production of NCARE Stations

The current mandate of NCARE does not allow its Research Stations to market any agricultural production, neither on the national nor international level. Theoretically, NCARE owns more than 3000 du of agricultural land scattered all over the country, which represents a significant potential for fruit and vegetable production. To differentiate itself from the local producers, NCARE should target the production of high value crops that are well standardised and packed. On the short term, direct contracting with local exporters might also enable rapid returns. Another opportunity would be to provide farmers with additional services like the establishment of a nursery to produce certified seedling (grafted and un-grafted) for sale on the local market.

The commercial approach should take into consideration the surface areas required, available means and the needs for scientific purposes. An NCARE plot should be clearly oriented toward the acquisition of reference knowledge to be used further by extension agents, rather than a strictly commercial venture. Part of the surface area could be dedicated to extension support and the remaining part to the production of certified seeds or plants with a clear and different status, in order to avoid any confusion between missions and objectives. Prior to implementation, a complete analysis of these factors must be conducted in order to define a sustainable methodology.

1.4.3 Increase support from the private sector

As mentioned previously, private companies are currently the main suppliers of technical innovations. While NCARE and LRA could provide these companies with visibility (through field visit for example), their technical and financial support could be used to establish other demonstration sites in the Research Stations.

LEVEL 2: METHODOLOGICAL LEVEL: PROMOTING A GRASSROOTS APPROACH

2.1 Involve farmers in extension planning

2.1.1 Include farmers in extension methodology planning

Key actors and farmers' associations should take part in the overall extension strategy elaboration through farmers' boards. Efforts to build the farmers' capacity to take initiatives will enable technical solutions that are more relevant to the farmers' constraints and contributes to the sustainability of actions. The aim of the farmers' boards would be to convey the communities' extension needs and follow-up the applied

research set up as presented in the following extension cycle. Participants in farmers boards should reflect a broad social spectrum but should also be segmented according to the technical skills and extension requirements of the category of farmers. For example, a traditional tomato grower does not have the same export requirements as a grower of cut flowers for export.

The technical need assessment would be the starting point of the extension cycle carried out annually in collaboration with the farmers. During this phase, the farmers would have to identify the problems encountered and examine the constraints that are causing the problems. This first step would develop the extension programs that will be carried out in NCARE Research Station by the RDU. A participatory monitoring and evaluation of the extension program should occur during its implementation to validate the first conclusions or define possible adjustments. After its technical and scientific validation, the extension message could be delivered to a broader population of farmers using the corresponding service.

2.1.2 Develop an interactive training process

Knowledge should be gained through interactive processes and the participants must be encouraged to make their own decisions. The learning by doing process, through the establishment of pilot farms and demonstration sites already experimented, should be replicated at a larger scale and must include other agronomic topics (e.g. IPM, fertilisation, variety screening). Training contents should be planned depending on farmers' technical skills and should not be addressed only to farm owners but also to permanent labour.

2.1.3 Improve the visibility of planning

The visibility of actions and experimental results should be presented through the publication of technical reports and field visits. Main technical messages should be summed up and presented using technical sheets that utilize an adapted scientific language convenient for farmers. Media to broadcast results could also be used to reach a broader population of farmers (e.g. radio, newspaper, etc.).

Conclusions

The approach implemented by IrWa project relies on two aspects: the empowerment of farmers and building an effective public extension service. The quality of the extension messages and the concrete involvement of farmers in extension strategy planning are key elements for the success of extension services and for re-establishing its credibility in the farming community. To accomplish this, NCARE will need to develop an innovative approach for agricultural extension to accommodate their mandate. Moreover, to be a key player, NCARE will have to overcome its current organisational and financial constraints.

NCARE needs the flexibility to generate income adequate to ensure the financial sustainability of its operations. IrWa project strongly recommends that NCARE's charter be modified to become a semi-public body with the mandate to assist farmers through extension service and the flexibility to engage in self sustaining revenue generating activities. This can best be achieved with a two pronged approach, first to increase the

financial participation of agricultural stakeholders through a direct or indirect contribution, and second to adopt a commercial approach for marketing the production of the NCARE research centres in Jordan.

To reach these objectives and implement its new mandate, NCARE will have to launch important internal institutional reforms. The collaboration with international funding agencies and international and local expertise is regarded as a tool that will facilitate the establishment of these new structures.

If the WUAs are to play a concrete role in water management in the future, then it is an absolute necessity to build their knowledge and capacity for irrigation modernisation and for them to assume their new functions. Adapted and well-oriented capacity building programmes will need to be provided to the WUAs to enable them to serve their core function: equitable water distribution to all the users relying on existing social structure. Furthermore, a constant focus on policy efficiency should be institutionalised and a periodical evaluation by an independent body will be required.

With government commitment, extension services can rapidly evolve to become innovative and consensus building organizations that empower farmers to influence policy making in their communities. With widespread adoption of modern water management techniques and with good quality and impartial advice and testing services available to farmers, Jordan and Lebanon can create sustainable agricultural systems that will be productive and profitable and make maximum use of restricted water supplies. The possibility to share the activities and avoid duplication between the two countries could also benefit other neighbouring countries.

List of Participants:

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32	Farmer	Mousa Abu Mdeiras
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