As introduced in past AAINews editions, AAI has been working on water saving irrigation agriculture extension in Syria since 2005 (see AAINews No. 78). In the Syria project, we promoted the results-oriented training and extension method (ROTEM), conducting training and supporting improvement of extension activities undertaken by extension staff (AAINews No. 68). Extension staffs are often characterized as having “insufficient technologies and knowledge to promote”, “no idea about the extension method”, and “no confidence to teach”. Given these concerns the ROTEM, which we used in our project in Syria, tried to ensure that trainees acquired water saving irrigation knowledge and techniques, and learned practical skills for extension activity planning and operation. The ROTEM linked training and actual extension activities following the flow – understanding of needs → selection of learning themes → extension staff training implementation → extension activities by trained extension staff → resolving farmers’ problems.

In the ROTEM, one needs in principle to clarify “what” and “how to” communicate to farmers at the initial stage of the training for extension staffs. Given this we devised the development of four extension tools, after contemplating how we could arouse the interest of farmers in the concept of water saving. And how we could communicate in a comprehendible manner to farmers who have a low level of knowledge on irrigation and awareness of the necessity of water saving. These tools are a “discharge measurement kit”, an “irrigation calendar”, an “irrigation notebook” and a “digital irrigation note”. Extension staff can communicate essential knowledge and information on water saving irrigation by explaining the use of the four tools and by distributing the material. Farmers will improve their awareness on water saving and farm management as a whole by using these tools.

The discharge measurement kit enables farmers to easily measure irrigation water amounts on their farming plots. By using this tool, farmers can understand the amount of water they are using for irrigation. The irrigation calendar is a tool that shows the necessary duration of irrigation for different crops. The irrigation notebook can be used as a cultivation record with notes and one can identify inefficiencies by recording daily farming activities. The digital irrigation note is the PC version of the irrigation notebook. It can automatically create graphs based on the data in the notebook for visual information presentation. By combining these four tools, farmers are able to know their own farming management in an objective manner, leading to increased awareness of the necessity of water saving.

In the next part of this series, we will introduce the inspiration of each of these tools, and describe what challenges occurred and what innovations were made to lead to the development of all these tools and outline the results obtained through the use of the tools to date.
In this 2nd part of the series, we would like to introduce the discharge measurement kit.

When visiting farmers’ plots in order to extend knowledge and information necessary for water saving irrigation, we notice that many farmers use their own method for laying irrigation pipes or leave it entirely to the service providers. As a result, at the end of the pipes often they cannot obtain necessary water pressure because of the influence of loss of water head due to pipe resistance and other causes. These can be a major barrier for modernization of irrigation systems at the farm level, resulting in slow progress when it comes to water saving implementation. Therefore, the project tried to raise extension workers’ and farmers’ awareness on the importance of water saving, distributing a kit that enables them to easily measure water pressure and volume.

As shown in the photo below, the kit is extremely simple, with a pressure gauge, a joining device for 16 mm drip lines, sealing tape and a 500 ml measuring cylinder in an easily portable carrier bag. In the beginning, we included in the kit a device to enable pressure measurement at the emitter point and a stop watch, however we came to understand that it is easier for farmers to use the kit if only the most basic and essential items are included. Therefore the kit became extremely simple in the end.

As for discharge measurement, for example, we measured the water volume that flows in five minutes from one emitter; this figure is then extrapolated to give the discharge per hour. One can repeat the measurement using a measuring cylinder at the different points. However, if there is enough manpower, it is possible to effectively check the uniformity at different points at the same time. In our project, we organized primary school students with a container in each hand. They stood at 9 different points and on the signal they all took the water for five minutes until they were told to stop. Then one person went around the nine points with the measuring cylinder to measure the water volume of each container. This event was quite popular. For some irrigation became fun!

Using ideas like this, and by using a very simple discharge measurement kit distributed by the project, extension workers and farmers came to understand the operation pressure of irrigation systems in use and the situation regarding the irrigation water volume. We hope that these on-site efforts will raise awareness of the importance of water saving, and will lead to expedite the extension of water saving irrigation systems which will be increasingly important in the world’s arid and semi-arid regions.
Further to the discharge measurement kit, in this part, we would like to introduce a irrigation calendar which can tell the adequate irrigation water amount required.

In order to provide an optimal irrigation amount for crops, farmers need to know how much water is needed for different crops and how much irrigation water they need. However, many farmers and extension workers we visited for project activities told us that it is difficult to judge how much irrigation water is needed. Most of the farmers seemed to be deciding on irrigated water amounts based on their own experiences and what they might have heard from other neighboring farmers.

In Syria where water saving irrigation has become one of the important national challenges, irrigation research centers have been established specializing in irrigation in individual governorates. These centers actively conduct various experiments to establish the optimal amount of irrigation water for different crops for different types of irrigation. Although on a limited scale, they also invite farmers and extension workers, and introduce them to research results. However, most farmers still do not know how much irrigation is necessary. In our project, we investigated the reasons behind this, and came to the conclusion that the documents and explanations the researchers provide are more for specialists and are therefore too difficult for farmers to understand. Hence, information does not get passed on accurately. Therefore, the project developed the irrigation calendar as a means to communicate to farmers the adequate irrigation water amount based on the crop water requirement.

The irrigation calendar consists of two discs on top of each other, just like the constellation chart. By sliding the front disc and adjusting the bottom of the disc to a right planting or sowing month, and adjusting the top window to the applicable month, recommended irrigation duration per time is shown. It shows one of three instructions - daily irrigation, every other day, or once in 4 days. On the back side, application conditions such as target area (governorate), crop type, irrigation method, are indicated. Recommended irrigation duration was estimated based on data from the irrigation research centers and using the crop water requirement as per the Penman-Monteith Equation and irrigation intensity depending on different irrigation methods.

The irrigation calendar’s theme is how simply (and interestingly!) it can be used. If we just write the same information on A4 paper, farmers may not see the content carefully and may simply throw it away. In order to introduce something new, taking the idea from the constellation chart, we made this a disk shape and sliding chart. Also, in order to ensure that everybody who uses this can read information accurately, we limited the information to a bare minimum – only the frequency of watering. When you ask Syrian farmers about irrigation regime, they usually respond like “every 10 days for 10 hours.” Therefore rather than indicating the “volume” of water, we decided to use “time”. The chart distribution was an integral part of the extension activities conducted by extension workers. They give the irrigation calendar, explaining to the farmers how to use the irrigation calendar and how much water and timing and duration of irrigation is appropriate for different crops.

Later on, extension workers asked the farmers about their impressions of the irrigation calendar. Many stated that they liked the simple system with only irrigation timing indicated. Some farmers voluntarily conducted an experiment comparing the yields from a plot cultivated using the irrigation calendar and another plot using the irrigation manners they had been always using. They confirmed that with the irrigation calendar, they could save water without compromising yields. The data we used in the irrigation calendar are collected from the research centers in Syria. The irrigation calendar was a memorable extension tool, which made us realize the importance of developing an optimal method for “communicating” existing information to farmers.
For the Project on Development of Efficient Irrigation Techniques and Extension Phase II (DEITEX II), which aimed to achieve water saving irrigation in agriculture by farmers, it was an extremely important task to understand the actual irrigation water amount. In order for farmers to practice water saving irrigation, it is essential for them to understand the actual situation of their farming plots. However, many farmers cultivate their crops based on vague memories and instinct, and they are not accustomed to keeping records. There were a small number of farmers who took notes on a scrap of paper, but no farmer was keeping records in a notebook. We developed the irrigation notebook, thinking that by keeping records in one notebook, and by understanding quantitatively the volume of their irrigation water and fertilizer inputs, farmers might notice what aspects needed to be improved in their farming. This idea was designed to lead to increased awareness about the need for water saving.

The irrigation notebook concept came from the “Maternal Health Notebook”. This is issued in Japan and provides all the necessary information on maternal health with sections for recording progress and information. This manual intrigued us because of its cover on both information and recording. We mulled over an irrigation version following the basic principles. It was just a thought. What finally triggered the development was that one extension worker with us requesting the Japanese notebook we were using. Many of the Japanese team members were using the field notebook which can fit in a shirt pocket. Every day, we would take out the notebook from the pocket to jot things down. For the Syrians, not accustomed to taking notes, our note-taking behavior, must have seemed curious. Intrigued, one day he asked for one. Rather than simply offering one, we decided to work on developing a Syrian version of the field notebook. We discussed daily with the counterparts regarding the size, page numbers and looks of the notebook. We visited printshop many times developing prototypes.

As in other extension tools, we first communicated to the extension workers the objectives of the irrigation notebook and how to use it. Then, the extension workers distributed the irrigation notebook to individual farmers as part of their extension work. To the farmers, we emphasized the point that the notebook is not for recording information for our project, but for their own future. We took care to minimize the farmers’ potential feeling of being imposed upon. From the planning and development stage, we were anxious as to whether the farmers would actually use them. However, once distributed, the notebooks were very popular and our worries were unfounded. During the project, when we visited farmers, we checked to see if they were using the irrigation notebooks. We also actively promoted the use of the notebooks. In some cases, the irrigation notebook was used as a communication tool, with the extension workers interviewing farmers and noting what they had to say in the notebook, and assisting them to compile their own observations.

We received unexpectedly positive feedback on the irrigation notebook. On the strength of this we produced the 2nd edition. In this 2nd edition, we tried to improve coordination between the notebook and other extension tools. We included guidance on how to use the discharge measurement kit and the irrigation calendar. We also added an analysis sheet to enable farmers to conduct simple economic analysis by themselves. Through these additions, we aimed at making the irrigation notebook even more practical and aligned with our project activities.

In April 2011 after we finished distributing the 2nd edition to farmers and when we were planning to make full use of the 2nd edition, Syria was engulfed by the Arab Spring. The Japanese team was evacuated and we could only provide remote support to the project from Japan. One year after the evacuation in April 2012, we invited counterparts, extension workers and farmers to Jordan to wrap up the project activities. We will never forget the deep emotion we felt when farmers and extension workers showed us the irrigation notebooks crammed full of records. We greatly admired their efforts despite their extremely difficult circumstances. We really hope that Syria’s situation will be stabilized as soon as possible and that the farmers will be able to focus on their farming work and make further use of the cultivation records.
In part 4 of this series, we introduced the irrigation notebook as a tool for farmers to understand the conditions of their farmlands. In this part, we will discuss the digital irrigation note, which is the next version of the irrigation notebook. The digital irrigation note is an IT program which allows automatic computer compilation and calculation of the information and records that were entered in the irrigation notebooks. It can also conduct simple farm business analysis, generating graphs.

As discussed in the previous part of the series, it is essential for farmers to keep records in the irrigation notebooks, in order for them to achieve water saving irrigation in agriculture by themselves. However, daily recording in the irrigation notebooks is not necessarily easy for farmers to continue, as it is monotonous work and difficult to see the immediate benefits. Therefore trying to incentivize farmers to diligently record information in the irrigation notebooks was always our major challenge. Our conclusion was to encourage farmers to become genuinely interested in using the notebooks. For this we thought it would be important to let the farmers immediately know the progress achieved by using the notebooks. This led to the development of the digital irrigation note using computers.

The digital irrigation note is a program using spreadsheet software. By entering records from the irrigation notebook, it can automatically calculate irrigation water amounts and fertilizer amounts, and farmers can instantly check these in graphs. Moreover, by entering specifications such as crops, regions, and irrigation methods, the program can generate monthly recommended irrigation water amounts and the correct duration of irrigation. By inputting soil analysis results, fertilizer amounts recommended officially by the Syrian Ministry of Agriculture are automatically calculated. Furthermore, if you enter harvest amounts and production costs, benefit of the cultivation is generated which is similar to the analyzing sheet in the irrigation notebook.

The ultimate aim of the digital irrigation note is for farmers themselves to use it. However few farmers had a personal computer and could use it in those days. Therefore, as an initial step, we decided to distribute the digital irrigation notes to extension workers for them to enter information from farmers’ irrigation notebooks. Extension workers and farmers formed a pair and worked jointly on recording information in the notebooks. In this way, the extension workers could continuously monitor the conditions of the farms, and could provide appropriate advice to the farmers based on information from the digital irrigation notes including the duration of irrigation.

In the beginning, these activities only targeted our project’s demonstration farmers. However it was a hopeful and fun project with some extension workers taking an initiative to expand the number of target farmers, and with some farmers coming forward asking to use the digital irrigation notes.
In this series, we have introduced water saving irrigation extension tools which were developed through the Project on Development of Efficient Irrigation Techniques and Extension (DEITEX). Extension tools are distributed to farmers by extension workers when they visit the farmers, with instructions on usage. DEITEX is aimed at enhancing knowledge and awareness about water saving irrigation through the use of the extension tools in daily farming work by farmers.

In the DEITEX project we believed that in order to achieve uptake of water saving irrigation practices, it is necessary for farmers themselves to work proactively on it. Therefore we thought extension work has to change the mind-set of farmers rather than simply enhance their understanding of irrigation systems and crop water requirements. We placed hardware, software and mind-set as the 3 pillars of this extension work. In addition, we conducted training of extension workers using themes that directly respond to the needs and issues which farmers face on a daily basis. An integrated Results-Oriented Training and Extension Method (ROTEM) was employed, whereby extension workers go out for extension activities based on the training. (See AAINews No. 68).

By introducing the water saving irrigation extension tools in extension activities, it became easier to conduct extension in terms of “software provision” and “mind-set change”, which had proved very difficult in the past. This also resulted in enhanced understanding and awareness by farmers on water saving irrigation. The farmers who used the discharge measurement kit could understand better the irrigation amount on their farming plots, which made them start fixing emitters’ blockage and purchasing appropriate emitters. Those who used the irrigation calendar and irrigation notebook conducted watering experimentation on their own farm plots and enhanced their understanding on appropriate irrigation amounts. Working with extension workers, some farmers even conducted farming diagnosis based on the records they compiled in their irrigation notebooks.

It was felt that by using tools that enable us to respond directly to farmers’ needs, we could raise farmers’ awareness and proactiveness. These extension tools are also effective as a medium of communication to connect farmers and extension workers. By concretizing issues farmers face through recording information in the irrigation notebook, extension workers’ advice can also become more accurate and relevant, which leads to a higher possibility for solving the problems. This will also result in establishment of trusting relationships between farmers and extension workers. By actively employing tools which farmers and extension workers can actually use on their farms in extension activities, rather than passive tools such as posters and leaflets, we feel that we could contribute to improving contents of extension activities and enhanced understanding and awareness on water saving irrigation technologies.