<<No.53>> August 1, 2007

AAINews

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At a JIRCAS Workshop

On 13th December 2005, we had an opportunity to participate in a workshop titled "Research development for sustainable agricultural productions in arid areas in West Asia," organized by the Japan International Research Center for Agricultural Sciences (JIRCAS). This workshop was a part of JIRCAS's research aiming to improve sustainable agricultural production in arid areas in West Asia. Attending the workshop were various researchers from JIRCAS and other institutes in Japan as well as from overseas institutions such as the International Center for Agricultural Research in Dry Areas (ICARDA).

Some of the presentations made at the workshop were:

1. Research Structure of arid land agriculture research in West Asian countries;
2. Introduction of the Development of the Integrated Drought Risk Simulation Model (DRISiMo) and methods for measuring soil moisture, aiming to effectively utilize limited water resources;
3. Screening method for generative reproductive cytoplasm of drought resistant wheat cultivars;
4. Research on functions and forms of root systems of drought resistant crops;
5. Research trends in arid areas in the field of crop production.

Researchers from ICARDA reported on 1) the water harvesting methods in West Asia and North Africa, and 2) improvement in drought resistant genetic features of wheat. Furthermore, an Afghan technician introduced ongoing activities to reconstruct research fields in the country devastated by civil war. The workshop, as a whole, was extremely useful for us to be able to improve our grasp of recent research trends.

AAI has been involved in agricultural development studies relevant to the contents of the workshop, including the Project on Development of Efficient Irrigation Techniques and Extension in Syria and the Study of Central Agricultural Experiment Station Rehabilitation in Afghanistan. Through these activities, we strongly feel the importance of "locally appropriate technology", "sustainable activities by local residents", and "utilization of local resources." These are key phrases of development assistance in recent years. It is emphasized that it is important to build up "something" which contributes to local peoples' livelihoods, by introducing easily usable and applicable technologies which make full use of locally available resources. In the workshop, ICARDA introduced a magazine called "Indigenous Water-Harvesting Systems in West and North Africa". This magazine is very useful as it introduces many water resource utilization technologies that can be applied in the field. We obtained a lot of information at this workshop, however at the same time, we felt that researchers should place more emphasis on development of familiar technologies that can be easily applied in the field.

Actually, during the Q&A session of the workshop, points were made about how to link research results with the actual people who need assistance, and the necessity of constantly providing feedback to the people in the research area about the research themes and topics, as well as the results. It should be obvious that any research topic of agricultural studies, as an applied science, needs to be set based on the actual problems people face on the ground. However, what we often hear at our work place is that many researchers do not fully consider the multifaceted problems of agriculture on the ground. Some people also point out that themes which are considered very important on the ground are often left untouched. Moreover, given the recent research trend of compartmentalization, it seems that there is a decrease in the number of researchers who are more comprehensively dealing with issues such as agricultural management, cultivation and agricultural extension.

Consultants like ourselves are in a situation which enables us to relatively easily obtain opinions and information from both researchers and agricultural practitioners on the ground. We have an important role as "glue" for information exchange between the researchers and practitioners, and we can act as a go-between for the two sides. Another important role we as consultants have is to pick up issues that tend to be ignored.

In Japan, AAI's activities includes training, lecturing at universities and exchanges with research organizations. Overseas, AAI is involved in development studies and surveys and exchanges with NGOs. We find it very meaningful to communicate opinions of researchers and practitioners to each other, making use of various opportunities. We will continue to perform our every day duties as consultants, bearing in mind the critical role we play.

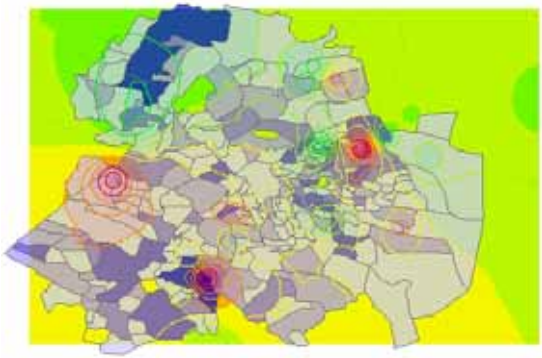
Part 5 – Case Study from Syria

In Syria, a country where the land surface is largely in arid, the area of irrigated agricultural land is increasing as irrigation is essential to increase and stabilize agricultural production. At the same time demand for water is increasing due to population growth, industrialization, and the increase in demand per capita resulting from modernization of lifestyles. With this background of serious water shortage in Syria, reduction of water use in the agricultural field, which constitutes over 80% of the total water use in the country, is one of the most critical problems to be tackled. However, although people recognize the importance and necessity of introducing water saving irrigation technologies, this is not followed by effective water saving actions due to a lack of policies and strategies. This fact led to our intervention to investigate and analyze the current state and limiting factors of water saving irrigation technology extension, and based on the findings, to make concrete recommendations for introduction of water saving irrigation systems. A JICA expert was also dispatched to provide advisory and training services for experimental research, extension activities and policy development to support farmers. In this project we used the GIS to assist in the selection of pilot sites for the introduction of water saving irrigation systems. The GIS was used to investigate a priority sites selection method which considers the water resource situation, the distribution of irrigated lands, and areas with water saving irrigation systems.

A GIS database was created to link statistical data and map information to aid selection of priority areas. The statistical data included cultivation areas per crop per village, total irrigated areas, and the area sizes under drip or sprinkler irrigation, while the map information included an administrative map with village boundaries. Using this database, pilot sites were selected using urgency, necessity and potential as criteria (see table). The maps below are examples of the analytical results. In Map1, the status of underground water levels and different sizes of irrigated areas were overlaid, to show areas with an urgent need for water saving measures. Map 2 indicates areas with a high need for the introduction of water saving irrigation in the future, by choosing areas with large irrigated land and a low rate of water saving irrigation.

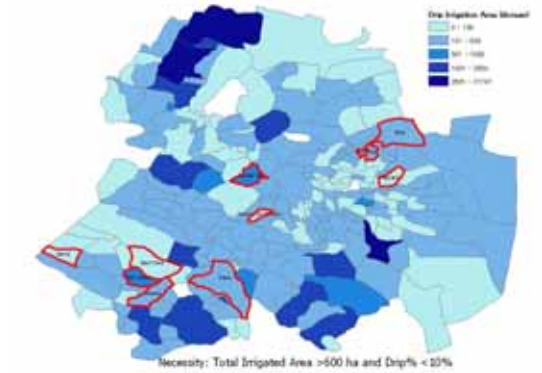
Selection Criteria for Identifying Priority Areas for Water Saving

Selection Criteria	Factors
Urgency Areas with need for urgent measures	Zones rapidly increasing coverage area of irrigated land
	Zones rapidly increasing areas with irrigation using wells
	Zones rapidly lowering underground water table
	Zones with large imbalance of water revenue & expenditure
Necessity Areas in need of water saving irrigation	Zones with low percentage in use of water saving irrigation
	Zones using a large amount of irrigation water (zones with a large irrigated area or with crops with high water needs)
	Zones with large areas with irrigation with wells and with high percentage of well based irrigation (heavy dependency on underground water)
Potential Areas with potential for water saving	Zones with large summer crop areas and with potential for significant water saving
	Zones with large irrigation water use
	Zones with low use of water saving irrigation



Map 1. Urgency: Overlay of information on lowering groundwater saving irrigation technology introduction

What we need to be careful of here is the availability of relevant information used for the GIS database and its accuracy. The data used were from national irrigation situation surveys conducted by the Irrigation Directorate and agricultural production data of extension offices overseen by the Agricultural Extension Directorate. The biggest difficulty was the lack of accurate information, and even when information was available, it was often either inaccurate or incomplete (e.g. data was available in some areas but not in others). The initial purpose of the GIS database was to use it as a tool for selecting priority sites for introducing water saving irrigation systems. However, there is a danger of creating erroneous results if analysis is made with inaccurate information. Therefore when the accuracy of obtainable data is low, it is considered that it is more appropriate to grasp general trends in the area as a whole, rather than pin pointing small areas. Accurate and beneficial analysis is possible if there is a large amount of accurate information. However, GIS can produce beautiful maps with all sorts of data, and there is a danger of "results" walking away in disguise as good-looking maps. When using GIS, we need to understand that qualitative and quantitative improvement and accumulation of data are key for effective use of GIS. In addition, it is important that data accumulation and improvement can be done in the same section using the GIS data. While developing this GIS database, we reaffirmed the essential importance of diligent and accurate data accumulation at the backstage of apparently splendid map outputs.



Map 2. Necessity: Areas with a large irrigated land and low rate of water and irrigated areas

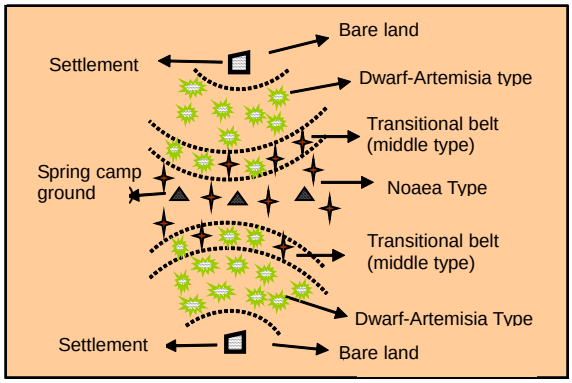
Part 5: Formation of human-induced grassland landscape

Around the Jebal Abd al Aziz (JAA) mountains, there are 58 livestock farming settlements of different sizes. However, in reality livestock farmers repeat seasonal movements along with their animals. Therefore it is very rare that all residents stay in a "settlement" throughout a year. The distance for migration is some 10 km, however as they basically move as a family unit, the seasonal move removes a part of the resident community, and at the same time brings in new livestock farmers from other settlements. In JAA, every year from late autumn, the population and livestock numbers start increasing, reaching a peak between March and May; from spring to the wheat harvest season.

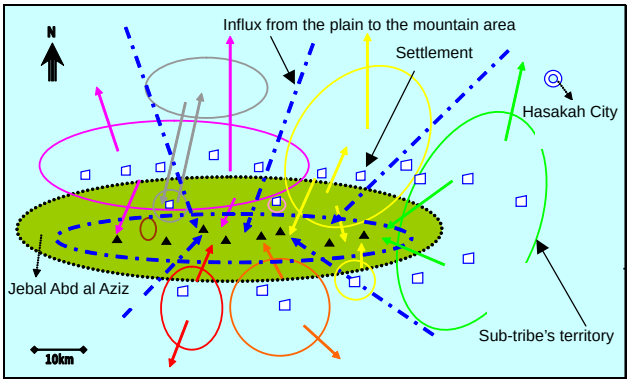
It was the spring of 1996 when a location survey of spring camping grounds was conducted throughout the JAA. We had great difficulty in understanding their highly scattered movement patterns within a limited timeframe. Their movements covered vast areas and were influenced by micro-topographies, resulting in very complicated patterns. In those days, the accuracy of GPS was not as good as it is now (average error of ±100m). We ran around the JAA with our Pajero, and recorded the geographical coordinates of all the 466 households that had moved in temporarily. In addition, we conducted a hearing to gather information such as tribe and sub-tribe names, home villages, duration of stay in JAA, billeting history and motives for migration.

I cannot go into the details of the survey results due to the limited space in the newsletter. In a nutshell, we found out that billeting places are freely chosen through an individual household's connections however they are regulated by a certain territorial system, divided and allocated between sub-tribes. It was also found out that people tend to use the same places every year. The figure on the right indicates territories between tribes and sub-tribes in JAA and their migration patterns. The green oval indicates the central area of the mountains (center) and this area does not have any perennial water resources. Therefore, there is no settlement in the area. However, from winter to spring, it is this central area rather than the surrounding area of settlements, where spring camping grounds are set up, using temporary pools created by rainfall and water ferried by water tankers. People and livestock from settlements in JAA as well as from plains areas outside JAA flow into this area. Households with relatively high numbers of livestock tend to migrate more actively. This leads to over grazing in the center, resulting in receding vegetation and a landscape with scattered pig weed (*Noaea mucronata*). In contrast, at the foot of the mountains, despite the constant pressure from grazing around the settlements, the impact of grazing on vegetation is relatively low, as the pressure from the important spring grazing tends to be avoided due to the seasonal migration to the center.

In addition to the utilization of rangeland, another human pressure on grassland is firewood harvesting practiced for daily bread baking as discussed in the previous issue of AAI News. As for the wood harvesting amount, the impact on vegetation is far greater around settlements than around spring camps whose temporary residents make short-term use of firewood. In addition, *Artemisia herba-alba*, which has been dwarfed due to grazing pressure, is selectively untouched and unaffected by harvesting pressure, as this particular species is not suitable as firewood. Therefore, as long as the human population and livestock numbers are appropriate, the typical vegetation type in areas around settlements would be the Dwarf-Artemisia type grassland dominated by dwarfed *Artemisia herba-alba*. Furthermore, there is a transitional vegetation type between the settlements and spring camps. This means that the grassland landscape of JAA is formed in belts from the north to the south. It is considered that the establishment of a human-induced grassland landscape is heavily influenced by the way livestock farmers have systematically used their surrounding environment. This usage includes territorial partition between sub tribes, seasonal migration routes and species selective grassland utilization, which were all gradually formed over years through changes towards a more sedentary lifestyle.



Belt Structure of Grassland Landscape



Migration route and territories of individual sub-tribes

[1] This survey was conducted as part of the ecological and socio-economic survey concerning utilization of environment by livestock farmers. The survey was part of the JAA Resource Management Project (1993-96); a joint project of the International Center for Agricultural Research in the Dry Areas (ICARDA) and Syria's Hasakah Agricultural Directorate. The author was involved in the project as a Japan Overseas Cooperation Volunteer (JOCV).

Part 3: Expansion of Irrigation Agriculture and Water Saving Irrigation

In the last two issues of this series we introduced the state of irrigation on farming plots and the results of irrigation experimentation research in Syria. In this issue we will look at irrigation agriculture in Syria as a whole, leaving a little bit of distance from individual plots. In an arid country like Syria, irrigation is essential to ensure stable agricultural production and to increase production. As indicated in Table 1, during the 15 years from 1985 to 2000, the irrigation area has doubled in size. It is worth noting that the increase was very sharp between 1990 and 1995. During this period, the area under well irrigation increased rapidly. The increase in the irrigation area in Syria is largely dependent on the expansion of well irrigation. Therefore, the expansion of irrigation area has been putting increasing pressure on precious underground water resources.

Table 1 Increase in Irrigation Area in Syria (ha)

Year	River Irrigation	Well Irrigation	Total Irrigated Area	rigation ratio
1985	333,597	318,306	651,903	11.6%
1990	351,026	341,951	692,977	12.3%
1995	403,394	685,497	1,88,891	19.8%
2000	512,499	698,151	1,210,650	22.6%
2001	512,607	754,282	1,266,889	23.2%
2002	515,510	817,271	1,332,781	24.6%
2003	505,981	853,675	1,359,656	29.2%

Table 2 Area with Water Saving Irrigation System in Syria (ha)

Year	Drip	Sprinkler	Total	Increase in Area	W.S.I.R
1998	4,339	75,053	79,392	-	6.5%
1999	8,553	80,480	89,033	9,641	7.5%
2000	17,700	101,634	119,334	30,301	9.9%
2001	33,214	109,415	142,629	23,295	11.3%
2002	46,368	137,412	183,780	41,151	15.3%
2003	56,622	160,310	216,932	12,459	16.0%

W.S.I.R: Water saving irrigation ratio

As the irrigation area increases, the ground water table is lowering, which has been calling for the necessity of water saving. In order to utilize limited water resources effectively, water saving irrigation methods using drip and sprinkler systems are generally more effective than the more commonly used basin and furrow irrigation methods. Table 2 indicates increase in water saving irrigation in Syria since 1998. Although water saving is spreading by an average of around 20,000 ha per year, the ratio of the area against the total irrigation areas accounted for only 16% by 2003. There are several reasons for the slow introduction of water saving irrigation systems, in spite of the fact that water saving in the agricultural field is becoming an important issue given the alarming rate of water resource depletion. The main reasons are the high price of materials for irrigation systems, complicated procedures to obtain loans for materials purchase, as well as insufficient understanding of the merits of water saving irrigation on the part of the farmers.

Incidentally, why are the farmers, who currently use drip or sprinkler irrigation, doing it? The textbook answer should of course be “to save water”, however, what is the reality? According to our survey of farmers, the majority of answers were it had been deployed to decrease labour need, due to, for example, the easier operation and maintenance of irrigation systems, and to increase harvests. Only a small number of farmers stated water saving as their motivation. Surely, some farmers using water saving irrigation, in particular vegetable farmers, have increased their per ha harvest dramatically, by combining use of liquid fertilizer mixing devices and plastic mulching. However, in this case, there is a hidden increased cost behind the apparent growth in harvest, which may not actually increase their net profits. Despite this, many farmers seem to be striving only for an increase in rough profits. Furthermore, as we introduced a case in part 1 of this series, farmers are not really saving water even when using drip or sprinkler systems. Hence, it is increasingly critical to emphasize awareness raising activities targeting farmers using water saving irrigation systems about the importance of consistently using appropriate amounts of irrigation water and informing them about the adverse effects of the use of fertilizer and other chemicals on the environment. At the same time, it is critical to ensure that farmers understand methods to analyse the economics of crop production, including investigation into production costs.