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Kanber R., Ünlü M., Özmen S., Önder S.

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THE STUDIES ON WATER SAVING IN SOUTHEASTERN ANATOLIA PROJECT AREAS

R. KANBER[*], M. ÜNLÜ[*], S. ÖZMEN[*] AND S. ÖNDER[**]
[*]Univ.of Çukurova, Agric. Struc. and Irr. Dept., Adana, TURKEY
E-mails: kanber@cu.edu.tr, munlu@cu.edu.tr, selcukozmen@hotmail.com
[**]Univ. of M.Kemal, Agric. Struc. and Irr. Dept., Hatay, TURKEY
E-mail: sonder@mku.edu.tr

SUMMARY - This paper presents a review of works on effective water use, which have been completed or not from 1985 to November 2003, and aims to determine the priority research topics in the South-Eastern Anatolia Project (SEAP) Areas. The information and relevant data from existing papers, articles and some scientific catalogues were collected and analysed. The number of completed researches from 1985 until November 2003 is 90 except the works on the participatory irrigation management. Most of studies (87%) are completed, and approximately 72 percent were on the subjects related to the crops and irrigation management. Among these studies, 61 percent (44% of total) includes subjects on full and limited irrigation and 29 percent (21% of total) involves crop-atmosphere relationships. The greatest number of studies has been conducted in 1996 and 2003, corresponding to 14 percent of the total in each year. On the other hand, most of the studies, which form the 94 percent of the total, were carried out by universities and institutes placed in the SEAP areas. 80 percent of studies were done in the Sanliurfa Region, 10 percent in Gaziantep and 5 percent in the Kahramanmaraş region. The total of 61 results of the works in which crops are directly used are reached. The industrial plants with 39 percent are used in the studies. Cotton and maize are widely used among the other crops. Legumes with 23 percent are the second crop. According to the results of the investigation, the studies are concentrated on one plant (cotton) and one region (Şanlıurfa-Harran Plain). Most of the studies are a replicate of each other. The studies were supported only by the state institutions.

Key words: water saving, irrigation, information retreaval, South-Eastern Anatolia Project area

INTRODUCTION

Due to increasing of population, which leads to growing demand for water resources, and pollution, that reduces fresh water yield, most of the Mediterranean Countries have serious water scarcity problems for agricultural production and urban/industrial consumption. Today, agriculture is the main consumer of freshwater in the Mediterranean countries and the drawn backing for agriculture is about 80% of the total freshwater sources. Even though in the world, which has an urban/industrial culture today, agriculture still continues to be the biggest consumer of water. For this reason, water saving opportunities should be considered within this domain. Prospective of water saving in agriculture ranges from genetics to agronomic, engineering, and different management options, including the use of non-conventional water resources. The success in water saving depends on the level of understanding and integration of cultural, economic, institutional and environmental contexts.

Water saving in Mediterranean Countries is still below expectations; because of there are lack of effective regional coordination, communication and dialogue among all the relevant stakeholders. Additionally, the results of water saving experiences are not effectively used to support formulation of adequate national and regional water saving programs and sustainable water policies; due to the lack of a common-shared knowledge base. In fact, in spite of several research activities on water saving have been carried out locally in the Mediterranean countries, no regional relevant co-ordination is in place today, which would produce the necessary impulse to establish communication among countries and define a common regional frame of cooperation on the relevant sector

This paper has been prepared under the WASAMED project which is a thematic network aiming at improving regional dialogue, communication, awareness and sharing knowledge on water saving in

Mediterranean agriculture. The results from all research activities on water saving have been carried out in Turkey were collected, and statistical aspects of some part of them belonged to South-Eastern Anatolia Project areas are given in this paper with aim to give information and knowledge in experiences on water saving and assessment of past and existing experiences and identifications of relevant gaps and problems in South-Eastern Anatolia Region.

METHODOLOGY

A collection of information about the studies on effective use of water by crops in South-Eastern Anatolia Project Areas has been done. The work consists in cataloguing of references (bibliography) for the period from 1985 to November 2003 on existing papers, articles, scientific catalogues prepared by Turkish Science and Technology Research Council, and General Directorate Village Affair, and on already completed and on-going projects. This work is proposed not only to catalogue information but also to retrieve-extract and review the data related to the sources of information collected in regard to WASAMED project and its four Work Packages: WP2 (Water Use Efficiency and Water Productivity), WP3 (Irrigation System Performances), WP4 (Non-conventional Water Use) and 5 (Participatory Water Management and Cultural Heritage). The collected data will be used for preparing the Country Reports-Reviews and, consecutively, for building of a comprehensive knowledgebase on water saving practices and experiences of irrigated agriculture in Turkey. In this paper, the collected data related to regional bibliography relevant to the thematic aspects addressed by the Work Package 2 are presented.

RESULTS AND DISCUSSION

Topics

The studies related to effective use of water have been started in 1974 with the establishment of Urfa Regional Soil and Water Research Institute (former TOPRAKSU) now called as Village Affair Şanlıurfa Research Institute. The results of the study were published in 1980s, after the establishment of the institute. This institute has mostly concentrated on studies involving plant-atmosphere relationships. Especially, the study projects were on obtaining the water consumption of important culture plants, the appropriate irrigation programs, and on study projects to find solutions to the problems that may occur during irrigation of Harran Plain in concept of the South-Eastern Anatolia Project.

Afterwards, the Head of SEAP Authority (Ankara), and related Şanlıurfa Regional Directorate of SEAP were established to coordinate all the studies involving SEAP region from one place. This organization has supported some of the basic researches under a special program. Some universities including Çukurova University have conducted and contributed on multiple studies on the effective use of water in the areas of SEAP, especially Harran Plain. The presented results are a short summary of the results obtained from all the organizations. However, the results of all studies conducted, published data and other activities may not be presented in this paper. In fact, due to inefficiency of our archives system, the assessment of all conducted studies was limited.

In Table 1 is given an outline of all the studies conducted and mostly computed in the SEAP areas according to topics and distinguishing also between research projects and thesis. The presented data indicates that a total of 90 scientific studies were conducted up to now. Besides, approximately 50 partially scientific, political, and social articles, abstracts and discussions on water saving were collected. As it can be seen from Table 1, 87% of the scientific studies are completed. The rest are still going on.

The results of all completed studies were published in scientific journals or presented in national or international meetings. Most of the studies, approximately 72%, were done on irrigation management. This is expected as a priority topic in an area that is going to be irrigated after centuries and where some problems may appear due to soil properties and climate characteristics of the region. Among the studies 61% (44% of total) includes the subjects on full and limited irrigation conditions and 29% (21% of total) includes crop-atmosphere relationships.

Table 1. The Research related with Effective Water Use by Crops in South-Eastern Anatolia Project Areas

Study Areas*	Completed Research Projects	On-going Research Projects	Completed Thesis	On-going Thesis	Total
IPOC	*50*	*7*	*7*	*1*	*65*
a-F-LI	33	5	2	-	40
b-IF	3	2	1	1	7
c-CA	15	-	4	-	19
IS	*17*	*4*	*4*	-	*25*
a-SIS	5	-	-	-	5
b-PIS	5	3	2	-	10
c- MX	7	1	2	-	10
Total	*67*	*11*	*11*	*1*	*90*

*IPOC, Irrigation programs of crops (Irrigation management); F-LI, Full and limited irrigation conditions; IF, Irrigation and fertigation; CA, Crop-atmosphere relationships; IS, Irrigation systems; SIS, Surface irrigation systems, and PIS, Pressurized irrigation systems including drip (buried and laid down on the surface), sprinkler and sub-irrigation by porous-hose pipe; MX, Mixed irrigation systems.

Studies on irrigation systems are not as commonly conducted as expected. They include 28% of the total studies carried out in the investigation period. Especially, the studies on pressurized systems involve 40 percent of these studies and 11% of the total. The low number of the studies was performed on the surface irrigation methods (20%, or 5% of total) which are widely used in this area, may preclude solution of the problems related to the subject.

Years

The number of studies varies from year to year as shown in Table 2. The first studies were published by the middle of eighties. The number of studies increased rapidly and in 1996 it has reached to the top point of 13 works in one year. In fact, 14 percent of the total studies were done at 1996. In the same year, 15% of IPOC (11% of the total) was handled.

The irrigation system projects have stationary increasing level in respect to the years. Most of the studies about the irrigation systems, which are 3, were done in 1995 and 1996. In the years after, the number of studies varies between 1 and 2. In the last year (2003), it is seen that the number of studies in both two topics are increasing. The studies carried out in 2003 include 14% (6% of the total) of IPOC topics and 16% (4% of the total) of irrigation systems. On the other hand, 14% of total number of studies since 1980's was handled in 2003. The increasing number of studies during recent years is due to both SEAP Administration and Turkish Scientific and Technical Research Council support to the defined areas of study and Harran University activities.

Institutions

The scientific studies done in SEAP area were conducted by different institutions as presented in Table 3. Most of the studies, which form the 94% of the total studies, were carried out by universities and institutes placed in the SEAP areas. University of Çukurova is the first one by handling with 38 studies which is 42% of the total amount, second is Village Affair Research Institute placed in Harran Plain with 35 works which is 39% of the total studies. It is important to underline that 90 percent of the studies stated by universities were supported by SEAP Authority.

Table 2. The Variation of the Works in the South-Eastern Anatolia Project Areas in the investigated period (1985-2003)

Years	IPOC				IS				Total
	F-LI	IF	CA	Total	PIS	SIS	MX	Total	
1985	1	--	1	2	--	--	--	0	2
1986	1	--	2	3	--	--	1	1	4
1987	2	--	2	4	--	--	1	1	5
1988	--	--	--	0	--	--	1	1	1
1989	1	--	--	1	--	--	--	0	1
1990	1	--	1	2	--	--	1	1	3
1991	4	--	--	4	--	--	--	0	4
1992	1	--	1	2	--	1	--	1	3
1993	5	--	1	6	--	1	--	1	7
1994	1	--	--	1	1	--	--	1	2
1995	2	--	--	2	2	--	1	3	5
1996	5	2	3	10	1	1	1	3	13
1997	4		1	5	--	--	2	2	7
1998	2		2	4	1	--	--	1	5
1999	2		1	3	--	2	--	2	5
2000	--	1	--	1	1	--	1	2	3
2001	4		1	5	1	--	--	1	6
2002	--	1	--	1		--	--	0	1
2003	6	3	--	9	3	--	1	4	13
Total	*42*	*7*	*16*	*65*	*10*	*5*	*10*	*25*	*90*

Table 3. Works on Water Saving Carried out in The Southeastern Anatolia Project Areas by Different Institutions

Institutions	*Districts*	*Subtotal*	*Total*
Research Inst.	Urfa	33	35
	Dıyarbakır	2	
GAP Directory	Urfa	2	2
DSİ	Urfa	1	1
Çukurova University	Urfa, Gaziantep, Maraş	38	
Harran University	Urfa	7	
Ankara University	Urfa	5	50
Ege University	Urfa	1	
Others	Urfa	2	2
Total			*90*

Third one is Harran University with 7 studies (7%), fourth one is Ankara University with 5 works (5%). However, the number of studies carried out by local administrations and universities with supporting of SEAP Authority and Turkish Scientific and Technical Research Council include a huge amount of in the total studies. These considered institutions have done nearly 50 studies.

Regional

Figure 1 shows the study areas. As it can be understood from the figure most of the studies have been carried out in Şanlıurfa region. In fact, in that region, 80 percent of the total works has been conducted. The studies in this area are still going on and it is obvious that the number of studies will increase in future.

Gaziantep with 10% and Kahramanmaraş with 5% come after Şanlıurfa. In the both areas this number of studies is a results of activities carried out by the universities and some research institutes such as cotton (in Kahramanmaraş) and pistachio (in Gaziantep), where irrigation investigations are extremely important and give great support to the water saving projects. The ratio of the studies is high because this region contains Harran Plain where has been chosen as pilot area for the irrigation of SEAP areas

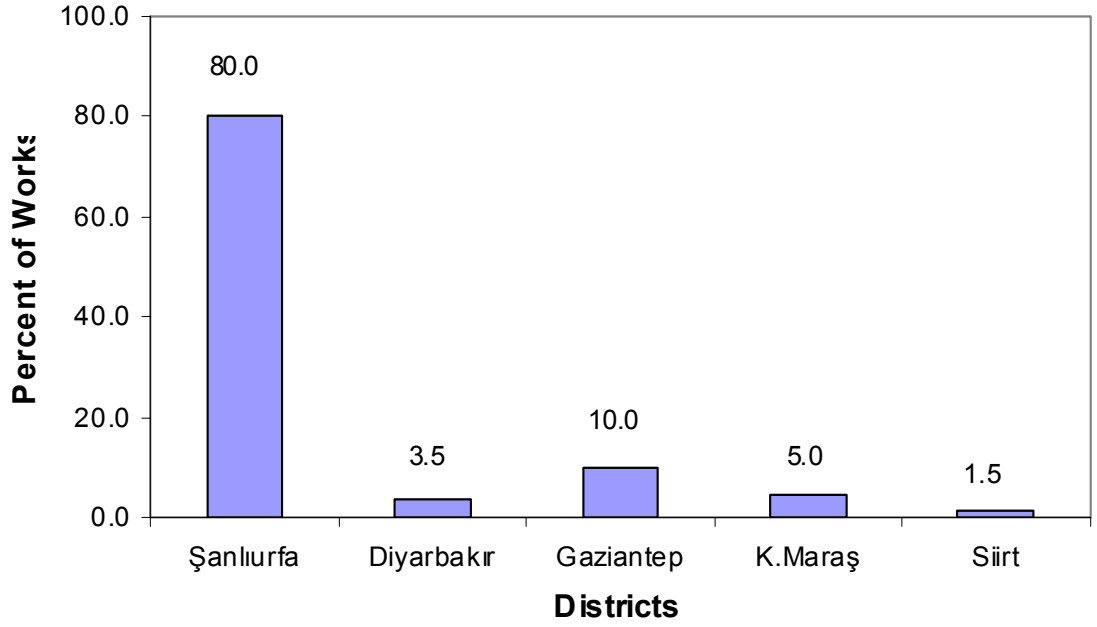

Fig 1. Schematic view of the regions where the water saving-works are carried out

Crops

The total of 61 results of the works in which crops are directly used are reached in this paper. Various crops which can be grown as to climatic and soil conditions of the region were considered in these types of experiments (Fig. 2).

As it can be seen from Figure 2, industrial crops are the plant group on which the most experiments have been done with 39 percent (or a total of 24 works). In this group, cotton and maize are used in the most works among the other crops. Especially, the cotton experiments increased due to the cotton planted areas in Harran Plain gradually reached up to 80 percent. Legumes are the second with 23 percent (14 works), and then vegetables with 11% (7 works) and fruits with 10% (6 works) are followed. The insufficient numbers of the experiments related by fodder crops can arise the doubts that the animal production in the region can develop easily to the desired levels. In the other works, strawberry, potato, sugar beet, and onion, which are planted locally in small area, are considered. The planted areas of these kinds of crops gradually increase depending on social and economics conditions of the region where these crops are planted or sown.

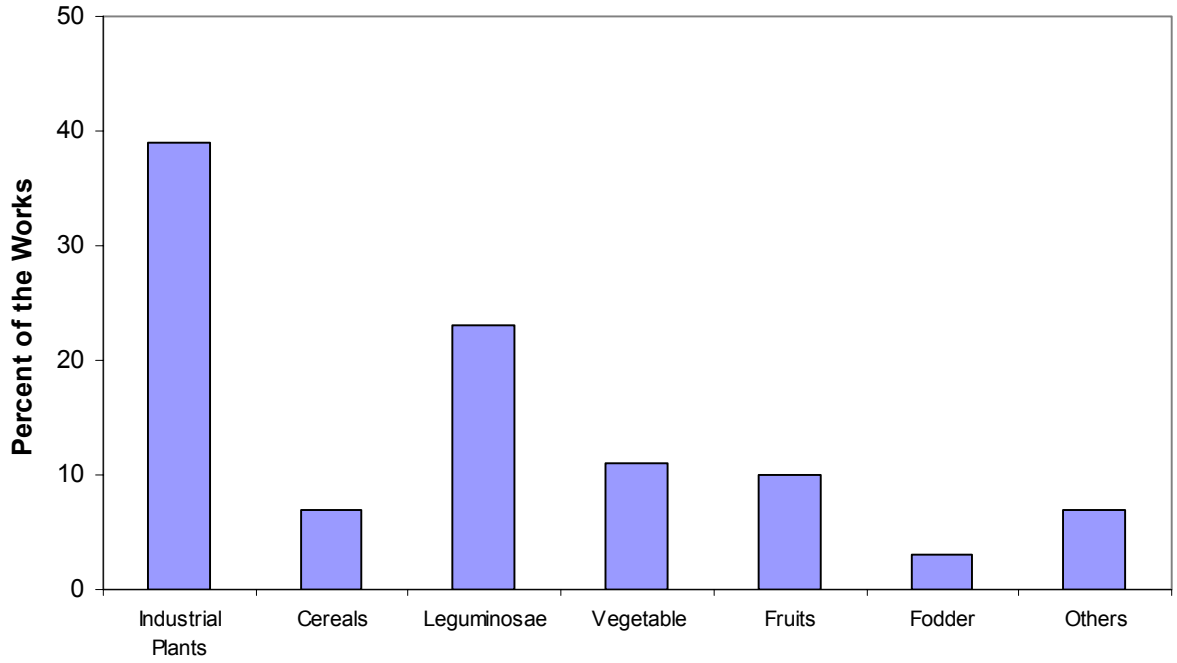

Fig. 2. Variation of the works on water sawing in the Southeastern Anatolia Project Areas according to crops

CONCLUSIONS

Some of the conclusions of the study are outlined in paragraphs below.

- The studies are concentrated on one plant (cotton) and one region (Urfa-Harran Plain). Most of the studies are a repeatition of each other. Because this area has been opened to irrigation recently, different types of problems may appear. Therefore, measures should be taken to direct the studies to include regional problems, and to distribute the studies equally to other areas in the region.
- The studies are coordinated by only two institutions Village Affair Şanlıurfa Research Institute and SEAP Authority. Private sector and public sector should be encouraged to support the study projects. For monetary support special measures and legal arrangements (supplement tax) should be made.
- More studies should be conducted on surface irrigation systems, which are widely used in this region. Especially, the studies involving the problems that may occur during water irrigation and their solutions should be supported priory.
- Measures should be taken to develop new techniques to conserve water and new projects on this matter should be supported.

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