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Farmer Behaviours and Sustainable Water Management in Semiarid Konya Closed Basin in Turkey

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ABSTRACT

Objective: This study aims to review group learning method effect compared to individual learning method on dyslexic students of second grade in elementary school and it evaluates whether their problem will be solved in group and by other`s help? Thus, two methods of learning- Jigsaw I and Jigsaw II methods -were used to review their effects on improving learning and reading of children. **Methods:** Pretest-posttest design was selected due to semi-experimental method topic. Kessler and mental scale was used to gather data and a test for recognizing reading called Shirazie test was used to determine disorder amount of students reading, also data resulted from pretest, posttest, follow up and delayed tests were used to gather information. Validity coefficient was estimated .87 and reliability coefficient was .96 for total scale, .94 for class scale, and .91 for practical scale during one month that reliability coefficients' median was reported .75. 30 students were delivered learning services in learning disorders center by one mentor, and in two shifts, preferentially 60 students were under learning services, in this study, 30 students of first shift was selected randomly as experimental group and 30 students of second shift was selected as control group. Gathered information was used for statistical tasks with the use of independent groups` t-test and SPSS software in order to compare performance of two independent groups of experimental and control. **Results:** Study findings indicate that group learning method effect compared to individual learning method on reducing the problems of dyslexic students of second grade in elementary students of Qazvin city. It is deduced from hypotheses that group learning compared with individual learning is effective in no addition and/or removing words in text, group learning compared with individual learning method is effective in no addition and removing letter or syllable, group learning compared with individual learning method is effective in no substitution of words in text, thus it can be concluded that students that are learned by group method are enjoyed better performance in reading skill.

Introduction

A large part of the surface of the world is arid and semi-arid regions. In every region of the world it is necessary to find or develop appropriate techniques for agriculture (Creswell and Martin, 1998). One of the Konya Closed Basin (KCB) is important for nature conservation in Turkey and globally, particularly for its wetlands and the diversity of its fauna and flora (Schipper and Schot, 2004). Although, Konya Closed Basin has the least amount of rainfall in Central Anatolia (Turkey), it has

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very important wetlands and 1.9 million hectares (ha) arable land and 1.6 million ha area is suitable for irrigation. In addition, there are 6 major plant sites and 16 important bird areas in the KCB. It is also breeding grounds to 8 out of 13 birds which are in danger of extinction all over the World (Berke et al. 2014). On the other hand, the region's production capacity has a strategic importance for Turkey's food security. In water-limited regions, ground water (GW) is often the only reliable water used primarily for irrigated agriculture. If GW abstraction exceeds the net GW recharge over prolonged periods, persistent GW depletion occurs (Gleeson et al. 2010). Over the last few decades, the KCB experienced huge non-renewable GW abstraction for irrigation, which caused a decline of approximately 1 m year^{-1}(Bayarı et al. 2009), 3 meters annually, and in some places, even more. In 2002, there were approximately 45,000 wells in the KCB, there are now over 100,000. The pace and rate of loss of biodiversity, especially in wetlands, is daunting. In 2011, approximately 2,023,513 ha of KCB were under cultivation. As of 2002, there were 1,760,456 ha under cultivation (FAO, 2014).

By changing to a closed irrigation system, 34% water saving was achieved, while consolidation of fields and moving to a pressurized irrigation system created water savings of up to 64% (DSI, 2014). The irrigation efficiency is 73.3% (total water requirement 683.5 mm = net water requirement / irrigation efficiency), the average net irrigation water requirement for the existing plant pattern is 499 mmin the KCB. In 2011, while the actual water use is estimated at 6.628 billion m^{3}year^{-1}(Şahin et al. 2013), the yearly irrigation water requirement is estimated at 4.319 billion m^{3}year^{-1} in irrigated areas of the KCB in the actual crop pattern condition (KOP, 2013). Net water requirement of irrigated area is notably greater than the available water potential of the basin. The cultivated land of high water consuming crops has increased by two folds. If this trend continues, ground water potential of basin will be wiped out in near future (Topak and Acar, 2010). The water that is used to irrigate 1 decare (da) of alfalfa can irrigate 1.43 da of vegetables and sugarbeet, 1.52 da of maize, 1.82 da of sunflowers, 1.96 da of potatoes, 2.08 da of beans, 4.08 da of wheat, and 5.00 da of barley in the KCB's conditions (Kara et al. 2008). During the study they carried out in Ankara, Yıldırım (1993) obtained product ranging between 290 and 1170 kg da^{-1} by applying irrigation water ranging between 79-1236 mm on eight different water surfaces for corn. In statistical evaluation, six irrigation topics where he applied 513-1236 mm water and obtained product of 937-1116 kg da^{-1} as the average of two years has been ranked as (a) and among these, an important difference was found at the level of 5%. The topic where 376,2 mm water was applied and efficiency of 812 kg da^{-1} was obtained has formed topic (ab). In the study he applied under the conditions of Konya for corn, by applying 0,60-0,80-1,00-1,20 times the evaporation measured with Pan A evaporation case, Kara (2011) has obtained efficiencies of 898,6 (b), 957,5 (b), 1318,8 (a) and 1318,7 kg da^{-1} (a) corresponding to 431-519-608 and 676 mm water, respectively. In his study on sunflowers where he applied plant-pan coefficient as 1,25-1,00-0,75-0,50 and 0,0 for five, 10, and 15 days intervals, Yavuz (2016) derived a product of 123,9-552,4 kg da^{-1} by applying water within the range of 40-664,3 mm, whereas Kpc 1,25 (655 mm-544,5 kg da^{-1}) and Kpc 1,0 (574 mm-547,2 kg da^{-1}) have formed the first group (a), Kpc0,75 (457,6 mm-398,3 kg da^{-1}) has formed the second group (b), and Kpc 0,5 (c) and Kpc 0 (d) have formed the other groups. Ertaş (1984), stated that under the conditions of the plain, reducing irrigation by 40% did not have a significant impact on efficiency and under these conditions in the region the requirement of sugar beet for irrigation water was 700 mm. Gencoğlan et al. (2005) concluded that when the irrigable area is large and water is scarce, a 50% deficit would be the optimum water deficit strategy for sugar beet. In Ankara condition, the highest net returns (333$ ha^{-1}) obtained by 13 % deficit in 828 mm irrigation water level and the highest net income obtained as 0.50994 $ for every cubic meter of water in 50% deficit condition. Irrigation water and yield were between 239-956 mm and between 2056-5202 kg da^{-1}. In the study he carried out on white beets in Ankara, Köksal (2006) obtained efficiency ranging between 1514,40 and 6705,77kg da^{-1} in return for his applying water within the range of 65 mm-865 mm at seven irrigation levelsand these topics have formed S_1 (997,1 mm 6558,29 kg) and S_7 (770 mm - 6705,77kg) a group, S_2 (851,65 mm -6288,07 kg) ab group, S_3 (739,65 mm- 5492,45 kg) b group, S_4 (561,1 mm- 3418,39 kg) c group, S_5 (448,5 mm- 2545,96 kg) d group, S_6 (387,3 mm-1920,44 kg) d group, as per requirements for irrigation water and their efficiencies. For refined sugar efficiency S_1, S_2, S_3 and S_7 have formed the first group (a), S_4 has formed the second group (b), S_5 (bc) and S_6 have formed the final group (c). As regards to restriction of irrigation water, Suheri (2007) has determined the most suitable irrigation topic to be S_{10} (7504 kg da^{-1}) to which full water restriction was applied at 996 mm during vegetative development and root puffing and 50% water restriction was applied during the maturation period. In the paper, soil and water capacity, and Water Balance and Sustainability in the KCB were investigated. Additionally, current irrigation practices and methods, farmer behaviors about irrigation were investigated by means of face-to-face interviews, with a focus on the sustainable use of water and land resources. In addition, the structural and legal framework, problems and solutions will be discussed on agricultural water use.

Materials and Methods

Study area

The KCB area is located in the south of Ankara in the heart of Turkey (Fig. 1). The area consists of two closed sub-basins that will further be referred to as Tuz and

Konya Basin (Camur and Mutlu, 1995). The area is surrounded by mountains (Schipper and Schot, 2004), and the high mountains in the south belong to the Toros range (Meester, 1971). The central parts of the area are characterized by the presence of plains at an elevation of 900 – 1050 m. The territory of the KCB area is roughly 53,000 km^2, and is located in Aksaray (14%), Ankara (4%), Antalya (1%), Isparta (2%), İçel (1%), Konya (56%), Karaman (12%), Nevşehir (1%), Niğde (9%) provinces, consist of 8.3% of the Turkey's land area, and 12.14% (2.889.500 ha) of the Turkey's agricultural area. 68.3% of the irrigated area in the KCB is located in the Konya plain, and 56% of total basin area is located in the Konya province. The study area is characterized by a semi-arid continental climate: summers are hot and dry whereas winters are cold and moist. Precipitation ranges between 280 and 640 mm $year^{-1}$ and is considerably lower in the centre of the study area than in the surrounding mountains. The Taurus Mountains are the main water source of KCB with high rainfall and snow feed the ephemeral rivers and recharge the aquifer. Land classifications are as follows: 41% agricultural lands, 34% pastures / rangelands, 13% forest lands, 8% wetlands, and 4% rock and sand dunes (FAO, 2014).

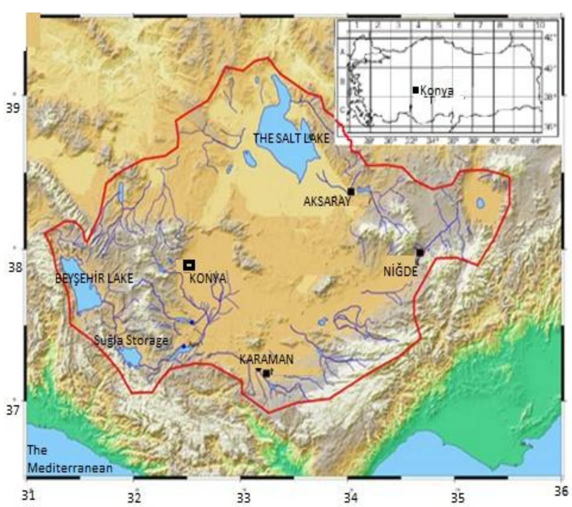

Figure 1: Showing the position of Konya Closed Basin.

The average annual temperature is 11.9 °C, and the average annual precipitation is 320.7mm. Most of the precipitation falls between October and May, and it is very poor during the growing period. Evaporation is high and moisture is low also.

Crop Patterns and characteristics of irrigation facility

Crop Patterns in Irrigated Lands of Konya Basin: winter wheat, sugar beet, beans, maize (grain+silage), potato, sunflower, vegetable, alfalfa and others are %37.6- 20.5- 6.1-5.2- 7.8 -2.7 - 8.1- 5.8 -6.2 respectively. Sugar beet is the highest water consuming crop with a value of 1.167 billion m^3 (Topak and Acar, 2010). The irrigation associations in the region who use surface water have been suffering from water loss in the secondary and tertiary canals, as high as 60% in some regions, due to the open canal grid system. On-farm irrigation method is primarily surface irrigation, typically "wild irrigation", spending more water than required. Less than 5 percent of the land is irrigated by drip or sprinkler systems (Özerol et al. 2011). According to 2006 data from the Abolished General Directorate of Rural Services, 13.65% of the total Irrigation Cooperative (IC) of Turkey is located in Konya. Irrigation facility of these (Totally 268 facility) are established as surface irrigation system (42%), sprinkler irrigation system (54%) and drip irrigationsystem (4%) based on features (Çelebi 2015).

Interview format and the other data.

Face-to-Face-Verbal-Interview was carried out in rural areas of Konya-Çumra. Çumra was chosen based on the following criterias: areas of intense irrigated cereals, forage crops, fruit, vegetable and industrial plants production, and water scarcity for irrigation.

Survey respondents were asked whether or not they use excessive water for irrigation, parameters and methods used for planning the irrigation schedule, the number of irrigations practiced for sugar beet irrigation per season, preferred irrigation method for sugar beet irrigation, education level of farmers, the reasons to prefer cultivating sugar beet, and whether or not they abandon sugar beet cultivation.

Calculated from farmers' data by the economical and technical aspects to the agriculture system in that area. Research area has so critical level of water so some crops need of more and more irrigation. Especially sugar beet and corn use more water in summer season, and this is the reason of scarcity of water in this area. Only calculated sugar beet need level of irrigation. The respondents were all males. The total sizes of the participants are 80 IC managers and 228 individual farmers. Each interview was recorded using pen and exercise book. Finally, the data were analysed mathematically. In addition to these, irrigation facilities were evaluated in terms of irrigation methods for all irrigation cooperatives in Konya. Chi-square test was used to see if this has made a significant impact of education levels of farmers on choosing the irrigation system.

Results and Discussion

Water and soil potential and water use in the KCB

Annual precipitation between the dates of 1960-1978 has shown fluctuation a wide range between 170 mm and 550 mm every 6-7 years. However, in the period after 1978, a significant change has been observed in the minimum and maximum precipitation values. Annual precipitation is followed by a fluctuating trend in the range of 176-400 mm in this period. Average precipitation was 320.7 mm between the dates of 1960-

2011, 326.0 mm between the dates of 1960-1978, and 317.7 mm between the dates of 1978-2011. The average rainfall in the next period of 1978 decreased by 8.3 mm compared with the 1960-1978 period. Originally, agriculture was based on rain-fed crops together with semi-nomadic sheep husbandry. Today, irrigation is leading to the development of other crops (sugar beets, lentils) and decreasing cereals (Fontunge et al. 1999). The Chamber of Agriculture Engineers (M.M.O.B.) has given cultivation areas and average efficiency values in Turkey as per the year (2015) and it was stated that these values were 408.367 ha and 45,9 t ha^{-1}, and 272.990 ha and 58,4 t ha^{-1} for the years 2000 and 2015, respectively. Even though cultivation areas for white beet were reduced in 2000 due to quota restrictions, at KCB, where water resources are limited, white beet is still being produced with a rate of 20.5%. A great deal of the KCB has and is being converted from steppe and wetland to crops. In the last 10 years, more than 250,000 ha have been put under cultivation. This is an increase of 42% (FAO. 2014). According to (Şahin et al. 2013) in the KCB 924,000 ha area are irrigated currently. According to Kara et al. (2008), irrigable unit's area with unit water and total irrigable area with available irrigation water using flooding method is 1.00 and 377.458 ha respectively. For the border and furrow methods, sprinkler method and drip method, irrigable units area with 1 unit water are 1,87, 2,67, 3,00 and total irrigable area with available irrigation water are 704. 514 ha, 1.006.399 ha, 1.132.373 ha respectively. According to this data, irrigable units area with per unit water for surface method (means of flooding method, border and furrow methods) is(1.0 + 1.87 / 2) = 1.44 and for pressurized irrigation systems (means of drip and sprinkler methods) is (2.67+3.0 / 2) = 2.84. In conclusion, the transition from surface irrigation (flooding, border and furrow) to pressurized irrigation (sprinkler and drip) methods could make possible (2.84 - 1.44 / 1.44) 97% expansion of the irrigated area. On the other hand, the available total annual agricultural water supply, the amount of water in use and total savings by transition to pressure irrigation (in %70 of the surface irrigation areas) can be accepted as 4 billion m^3(Kara et al. 2008), 6.628 billion $m^3 year^{-1}$(Şahin et al. 2013) and (662810^6 m^3x0,42x0,97x 0,70) 1890 10^6 m^3respectively. In this condition, Overuse quantity (6628x10^6-4000x10^6) and needed additional water quantity (262810^6 m^3-1890 10^6 m^3) are 2628 10^6 m^3 and 738 $10^6 m^3$ respectively. It is estimated that inter-basin water transfer are feasible to 550 10^6 m^3. If an additional area is not opened to irrigation, and transition to pressurized irrigation realize in 70% of surface irrigation areas, and (738 10^6 m^3-550 10^6 m^3)188 10^6 m^3 of water is saved by changing the cropping pattern and limited irrigation, irrigation in 924.000 hectares area will ensure that groundwater level does not fall. If these do not become a reality, the quota of 250 mm for personal wells and 350 mm for IC wells will be put into practice by the DSI in the coming years. If these quotas come into force, revenue loss (34%) will occur in the KCB. Production is expected to decrease by 35% on fruit, 51% on sugar beet, 53% on corn, 52% on beans, 56% on potatoes, 56% on alfalfa, and corn for silage. In addition, animal husbandry and agro-industries will also be affected negatively (Sade and Vanoğlu, 2012). Relationships among Seasonal water consumption and irrigation water needs for some crops in Konya based on relevant study are given in Table 1.

Table 1: Seasonal water consumption, water needs (Kara et al. 2008; Topak et al. 2008) and estimeted net income (Peker and Kan, 2010) for some crops in Konya

Plant-Net income ($/da)	Plant Water consumption (mm)	a-Irrig. Water requirement (mm) /b-applied water (mm) in KBC/ difference b-a (%) a / b / b-a	As a percentage of total cultivation area
Alfalfa- (77,87)	1200	1000 / 1000/ 0	5,8
Vegetables	750	705 / 750 / 6	8,1
Sugarbeet- (93,58)	825	705 / 1050 / 49	20,5
Maize- 136,95)	685	630 / 800 / 27	5,2
Sunflower- (3,22)	615	500 / 600 / 20	2,7
Potato- 63,94)	605	540 / 700 / 30	7,8
Bean	555	480 / 750 / 56	6,1
Wheat- (34,31)	441	245 / 400 / 63	37,6
Barley- (38,77)	420	200 / 350 / 75	15,0

As shown in the Table 1, high profit plants consume more water. Sugar beet consumes 32.2% of total irrigation water with 20, 5 % of the cultivation rate. On the other hand, a greater difference in terms of unnecessary water consumption (applied water - water requirement = water saving orunnecessary irrigation water applied) observed in barley, wheat, bean, sugar beet, potato, maize, and sunflower, respectively. This means that irrigation number and irrigation duration are more compared to need, as well as low irrigation efficiency. The difference of weighted mean is 46.6 % or 176.4 mm. According to this data, (920000 ha x 176.4 mm) 162310^6 $m^3 year^{-1}$ of water can be saved by controlling the irrigation number, irrigation duration, and irrigation methods. This is greater than the needed additional water quantity (738 10^6 m^3).

On the other hand, while average parcel size was 1.61 ha before consolidation, it became 3, 61 ha after the consolidation in Kisecik-Karaman-Turkey. While in the open channel transmission structure direct access to an irrigation channel was 61%, with consolidation this ratio has reached 100%. While water drawn from underground wells was 14.583.022 m^3 before consolidation, as modern irrigation systems began to be used together after land consolidation, this value fell to the level of 5.253.177 m^3. Water saving of 64% was obtained by moving to a consolidated and pressurized irrigation system (DSI, 2014). In addition, that some field crops including cotton, maize, wheat, sunflower, sugar beet and potato are well suited for deficit irrigation applied either throughout the growing season or at pre-determined growth stages (Kırda, 2002). Irrigation of sugar beet with drip irrigation method at 75% level had significant benefits in terms of saved irrigation water (Topak et al. 2011). When irrigable area is plenty and water is scarce, the water deficit strategy is applicable by 50% deficit. If water were not scarce, the water deficit strategy would be applicable on the order of 13% Gençoğlan et al. (2005).

To use water resources sustainable in Konya basin, deficit irrigation by drip system could be beneficial especially for summer crops like sugar beet, potato, maize, dry bean, pepper and sunflower, and they have the strong findings that 20-25% deficiency in irrigation water could be reliable solution for sustainable agricultural water management (Acar et al. 2014). This result shows that significant water savings can be achieved by making land consolidation and deficit irrigation in the region.

Institutional and legal structure of water resources

The European Union's Framework Directive redefined sustainable use of groundwater resources, stating that, for good management, only that portion of the overall recharge can be abstracted, which is not needed by the ecology (Gökmen, 2013). According to Sustainable Ground water Management Act. (2015) in California, a person who extracts groundwater in excess of the amount that the person is authorized to extract under a rule, regulation, ordinance, or resolution adopted pursuant to Section 10725.2, shall be subject to a civil penalty not exceeding $500 per acre-foot extracted in excess of the amount that the person is authorized to extract. Regulations for water usage in Turkey are different from the European Union and the United States. In Turkey, water-related activities are centrally planned in co-operation with experts from all sectors and there are governmental and non-governmental organizations at the user level for the purposes of operation and maintenance. The Water User Association, Groundwater Irrigation Cooperatives, Public Irrigation, and individual people are the main users of irrigation. Except some springs located on private land, the development of water resources is under the responsibility of the state. Unfortunately, there is no "water law" covering all water issues. The General Directorate of State Hydraulic Works (DSI) is the primary institution authorized to manage water resources. All water resources are managed in accordance with Law No. 6200 on the organization and duties of DSI (Vliegenthart et al. 2000). There is no institutional and legal structure in Turkey that coordinates, controls and finances the planning process at the waterbasin scale, some principles were partially met, while some other were not met at all. Farmers hardly (if at all) pay for the water and therefore no incentive for the economical use of water; irrigation methods are often inefficient (Kibaroğlu et al. 2011).

The survey results

56.2% of IC manager and % 64 of farmers stated that they use more water compared to need. 3% and 97% of sugar beet formers applies surface irrigation and sprinkler irrigation respectively. On the other hand, while the KCB's water needs represents 499.4 mm, the actual consumption is 815.3 mm (Topak et al. 2008). According to Poçan (2008), to produce 4750-5000 kh da^{-1} sugar beet, 650-700 mm irrigation water is sufficient in KCB conditions. Whereas up to 1000 mm of irrigation water is being applied for sugar beet in KCB, theappropriate irrigation water requirement of sugar beet was foreseen by Süheri (2007) as 996 mm, by Gençoğlan et al. (2005) as 478 mm at the net intake level per cubic meter water and as 828 mm at the level of maximum net intake, and it was foreseen byKöksal (2006) within the range of 770-852 mm. Topics for which Yıldırım (1993) obtained 937 and 1116 kg da^{-1} of product for corn as corresponding to water at levels of 513 and 1236 mm, respectively and these have been ranked as first, forming group a. Kara (2011) has stated that the topic where 1319 kg da^{-1} product was obtained under the conditions of Konya for corn, as corresponding to water at 608 mm has been ranked as the first topic. In the study conducted by Yavuz (2016) on sunflowers, application of Kcp 1,0 (574 mm-547,2 kg da^{-1}) has formed the first group (a). Water applied at KBC was given as1050 mm for sugar beet, 800 mm for corn, and 600 mm for sunflower (Table 1). According to Ertaş (1984), Yıldırım (1993), Gençoğlan et al. (2005), Köksal (2006),Süheri (2007), Kara (2011) and Yavuz (2016), quantities of irrigation water at KCB are more than required for the three products. The results of the survey are supported by relevant studies.

Levels of economical irrigation water calculated for sugar beet that is produced in the region in the highest quantities as being among the plants that require high consumption of water are given in Table 2.

Table 2. Applied irrigation water (mm) and marginal income in sugar beet cultivar *

Number of irrigation	Aplied irrigation water (mm)	Productivity (kg/ha)	Marginal productivity (kg)	Marginal income (TL)	Marginal irrigation cost (TL)
<5	335	20834	-	-	-
6-7	664	29509	8675	1380	1200
8-9	800	46266	16757	2681	1200
10-12	**1010**	**67038**	**20772**	**3324**	**1200****
>12	1205	73893	6855	1097	1200

*Calculated from (Süheri, 2007).,(Köksal, 2006), GürgenTarım03630

** Economical marginallevel of irrigation.

Economical number of irrigation was calculated as 10-12 and applied water 1010 mm (Table 3). Efficiency of sugar beet increases as the quantity of water applied increases and as net income is considered, irrigation at the level of 1010 mm in the season is seen to be economical. It is thought that this situation arises since irrigation water is only provided as free against repair and maintenance expenses in the region. As it is considered that the irrigation water requirement and plant water consumption of sugar beet are 705 and 725 mm (Table 1), respectively, in regions where water resources are limited and agricultural fields are plentiful, consumption of water at the level of 1010 mm (Table 3) can disrupt the water balance in the region. In the region for the year 2016, water prices range between 8,50 and 18,0 TL da^{-1} as per the type of products and they are too low to be worth considering. Almost all of the irrigation costs are composed of energy and labor expenses. In case water is measured and priced at its real value, it doesn't seem to be possible for the farmers to meet the costs. Therefore, if consumption goes above the quantity determined for scientific research and if water is completely priced based on cost values, the real economical production point could be reached. A similar situation exists for corn and sunflower. The main reason for excessive water use is to apply watering more than need because of the failure in following the soil water content. Responses of farmers about the irrigation Schedule are given in Figure 2.

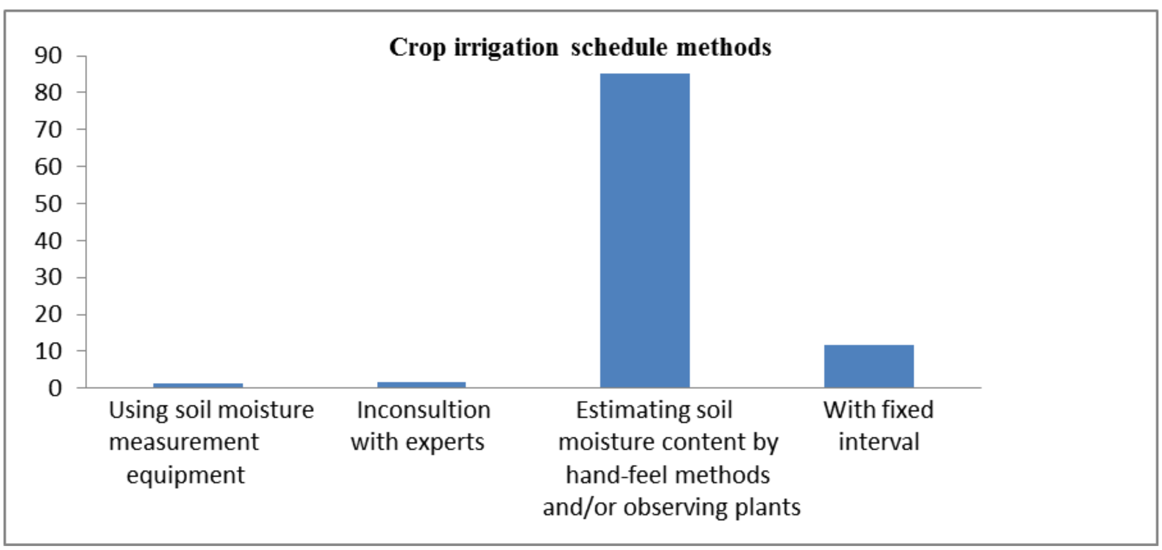

Figure 2. Responses of farmers about the irrigation Schedule.

Survey results show that farmers do not use the scientific data to determine watering start time, watering finish time and watering duration. 85.1% of the farmers said that they usually start to irrigate using Hand-feel method or/and observing the plant leaves to determine the soil moisture content. UMA (2007) stated that with few exceptions, this technique (schedule irrigation by drawing on past experience: observing the condition of the plants, examining and feeling the soil to determine the soil moisture content) largely overestimates the crop water needs.

Relationships between preferred irrigation methods and education level of sugar beet farmers are presented in Table 3.

Table 3. Relationships between preferred irrigation methods by farmer's education level

			Irrigations Systems			Total
			Surface	Sprinkler	Drip	
Education Level	University	Count	1	56	1	58
		% within Education Level	1.7%	96.6%	1.7%	100.0%
		% within Irrigations Systems	6.7%	19.3%	33.3%	18.8%
		% of Total	0.3%	18.2%	0.3%	18.8%
	High School	Count	4	63	2	69
		% within Education Level	5.8%	91.3%	2.9%	100.0%
		% within Irrigations Systems	26.7%	21.7%	66.7%	22.4%
		% of Total	1.3%	20.5%	0.6%	22.4%
	Elemantary	Count	10	171	0	181
		% within Education Level	5.5%	94.5%	0.0%	100.0%
		% within Irrigations Systems	66.7%	59.0%	0.0%	58.8%
		% of Total	3.2%	55.5%	0.0%	58.8%
Total		Count	15	290	3	308
		% within Education Level	4.9%	94.2%	1.0%	100.0%
		% within Irrigations Systems	100.0%	100.0%	100.0%	100.0%
		% of Total	4.9%	94.2%	1.0%	100.0%

Table 4. Statistical analysis of relationships between preferred irrigation methods by farmer's education level

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.278[a]	4	.179
Likelihood Ratio	7.441	4	.114
Linear-by-Linear Association	2.501	1	.114
N of Valid Cases	308		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .56.

According to the Chi-Square test, the education level has made an impact on choosing the irrigation system ($p>0,20$). Sprinkler, drip and surface irrigation systems were preffered 94.1%, 1.0% and 4.9% respectively. The sprinkler system was preferred by 94.8%, 92.4% and 94.8% of university, high school and elementary/secondary school graduates farmers, respectively. Drip irrigation system was not preferred by elementary / secondary school graduate farmers. Here, the education level has not made a significant impact (5% level) on choosing the irrigation system. In sugar beet cultivation, sprinkler method is the most common method. But, in-row cultivation such as corn, tomatoes, peppers and etc. furrow and drip methods are more common. Sure, farmer' would like to production decision for quaranty marketing sales, price and the observation incomes level. Farmers were asked for preference reasons to sugar beet cultivation and whether they abandon or not sugar beet cultivation. Their answers are given in Figure 3.

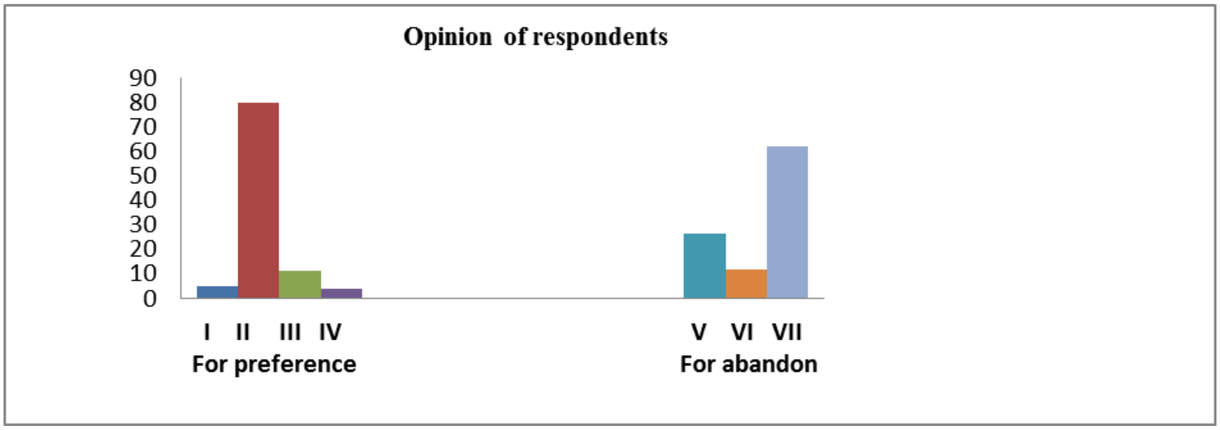

Figure3: Opinion of respondents about Preference reasons to sugar beet cultivation and whether they abandon or not sugar beet cultivation (I. Sugar beet production is easy, II. There is sale guarantee, III. It is routine in rotation, IV. It is more profitable, V. I can abandon for more profitable crops, VI. I will continue in rotation, VII. I don't abandon).

According to Ersun et al. (1997), sugar beet can provide a product increase that is six times that of cereals, 1,7 times that of legumes, and 3,5 times that of sunflower. As shown by Peker and Kan, (2010), maize and alfalfa were popularized by state subsidies. The cultivation areas of these crops may be reduced with the removal of government support. Sugar beet was also popularized due to the high profitability and sales guarantee. According to the findings in Figure 3, the basic preferences reasons of sugar beet cultivation are sales guarantee and more profitability. 61,9% of farmers said that they will not abandon sugar beet cultivation. The rate of those who expressed will abandon for more profitable crops than sugar beet is 26,2%. According to Peker and Kan (2010), the unit price of sugar beet should be reduced by at least a ratio of 2/3 or variable costs should increase by 66,6 % to encourage farmers to give up its cultivation. According to Topak et al. (2008), the main reasons for the increase in sugar beet cultivation are: the opening of new cultivation areas due to the establishment of two new sugar factories in the basin, and lack of marketing problems because the contractual purchase and unit prices of sugar beet are high. These findings are paralleled in the work of Peker and Kan (2010), and Topak et al. (2008).

Conclusion

An independent organization that does not depend on political and bureaucratic structures, as in California, must be charged with the operation of the region's water resources. After the water abstraction from the system is measured, irrigators should be charged for their portion of water consumption that exceeds the optimum irrigation level standard. For the operability of the fee process, a debit card could be used. The watering start time, the quantity of water applied, and the watering duration can be determined by the Ministry of Agriculture through a measurement system and dedicated team. Deficit irrigation can be applied for suitable plants. As indicated by Topak et al. (2014), in water-starved regions of the World, water saving should be started first in agriculture. Efficient use water in agriculture is vital important for sustainable water use in agriculture. As it is thought that water saving of 64% was achieved by moving to a consolidated pressurized irrigation system (DSI, 2014), applying consolidation in all of the irrigated fields is one of the most important measures to be taken. The Ministry of Agriculture has decided to move to a new support model known as the agricultural basin production and support model (ABPSM) for the whole country in 2009. In ABPSM, the 30 production basins were determined, and the ministry intends to support the basis of the basin rather than its products. It plans to change the ratio of agricultural supports based in the basin. According to this model, the plants that will be supported in the KCB are: barley, sunflower, wheat, canola, dry beans, lentils, corn, peas and oats. By supporting lower-water-demand plants, this model will reduce the pressure on water resources. The measures such as the transition to new plants that have higher income and are less dependent on water, organic farming, contractual farming and the creation of trademarks of processed products can also contribute to solving the problem. Otherwise, groundwater limitations will make agricultural practice very difficult and problematic. Problems in the wetlands will also be reduced by ensuring a sustainable balance of agricultural irrigation.

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