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PROPERTIES OF IRRIGATION WATER QUALITY IN KONYA CLOSED BASIN

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ABSTRACT

This investigation was carried out on 90 irrigation water samples collected from various places of Konya Closed Basin in irrigation period (June, July and August), 1999. The samples were analysed to determine pH, EC, Ca^{++}, Mg^{++}, Na^{+}, K^{+}, CO_3^{--}, HCO_3^{-}, Cl^{-}, SO_4^{--} and B ions, and from these data RSC, SAR and quality classes calculated. The results showed that one surface water sample (May Dam) was found not suitable due to its high pH value of 8.70. The other surface waters were found suitable for irrigation related to their EC, B, SAR and RSC values. In general, the parameters measured on Çayhan Pond water were higher than those of the other surface waters. However, two underground samples were found unsuitable because of very high EC values. Normal values of B, SAR and RSC were found in the underground waters. The data of Sazlipinar were generally higher in comparison to other underground waters. The pH and B values of surface waters were higher, whereas EC, total cations, total anions; SAR, RSC and quality classes were lower than those of underground waters.

Key Words: *Konya Closed Basin, irrigation, water quality.*

KONYA KAPALI HAVZASI SULAMA SULARININ ÖZELLIKLERI

ÖZET

Bu arastirma, 1999 yili Haziran, Temmuz ve Agustos aylarinda Konya Kapali Havzasinin degisik yerlerinden toplanan 90 adet (3 ay x 30) sulama suyu (15 adet yerüstü + 15 adet yeralti) örnegi üzerinde yürütülmüstür. Örneklerin pH, EC, Ca^{++}, Mg^{++}, Na^{+}, K^{+}, CO_3^{--}, HCO_3^{-}, Cl^{-}, SO_4^{--} ve B analizleri yapilmis ve bu sonuçlardan da yararlanarak BSK, SAO ve kalite siniflari belirlenmistir. Arastirma sonuçlarina göre, yerüstü sularinda bir örnek (May Baraji) yüksek pH degerinden (8.70) dolayi sakincali bulunmustur. Tüm yerüstü sulari EC, B, SAO ve BSK yönünden sulamada uygundurlar. Çayhan Göleti suyunun analiz sonuçlari diger yerüstü sulama sularininkinden genellikle daha yüksek çikmistir. Yeralti sularinda ise çok yüksek EC degerlerinden dolayi iki örnek (Sazlipinar ve Küçükaslama) sakincali bulunmuslardir. B, SAO ve BSK yönünden bir problem yoktur. Sazlipinar suyunun analiz sonuçlari diger yeralti sulama sularininkinden genellikle daha yüksek çikmistir. Yerüstü sularinin pH ve B degerleri yeralti sularininkinden daha yüksek, EC, toplam katyonlar, toplam anyonlar, SAO, BSK ve kalite sinifi (C_xS_x) ise daha düsük olarak belirlenmistir.

Anahtar Kelimeler: *Konya Kapali Havzasi, sulama, su kalitesi.*

INTRODUCTION

In agriculture, the yield could be highly increased only by irrigation, if the other factors such as fertilizer application are sufficient. Plants uptake both hydrogen and oxygen from irrigation water. Water is not found as a pure form in nature due to mineral matters contained, called salts. Water also plays a very important role for soil formation. It softens and loosens the minerals in the rocks. Quality irrigation water sometimes contains sufficient and appropriate nutrients. It should not contain harmful matters for plant and soil, and it has neutral pH and low salt concentration.

The sources of water for plants are rain, surface and underground waters. The chemical compositions of irrigation water are affected by soil and geological properties of the region. As a result of this, the type and quantities of chemicals contained could be different, that's why, irrigation water can either be useful or harmful to plants and sometime large areas of agricultural lands became desert due to inconvenient practices (Meng et al., 1984). The calcium uptakes of plants diminish due to excess sodium in the soil solution in the root zone. The high salinity, boron, chlorine and bicarbonate in water are harmful for plants (Lal and Lal 1990).

The surface and underground waters of Izmir, Manisa, Aydin and Mugla provinces are slightly acid-alkaline in reaction (pH), has low and very high salinity (EC), low and very high sodic (Na) and low and high boron (B) levels (Saatçi 1967).

The irrigation waters of Inside Aegean Region are weak acid-alkaline in reaction (pH), have low and very high salinity (EC), low and very high sodic (Na) and low and high boron (B) levels. On the other hand, irrigation water can be classified in respect to total salt concentrations and element types. The water quality can be expressed by the level of EC, SAR and B levels. The reliability of irrigation water analysis depends upon the sampling procedures (Kovanci 1979).

The Na^{+} and Cl^{-} concentrations of irrigation water were almost the same and main ions were Ca^{++} and HCO_3^{-}, if the water came down calcareous layers. If the SO_4^{--} concentration was lower than the other ions, it meant SO_4^{--} was reduced, if main anion was SO_4^{--}, this type of water solved much gypsum. Gypsum

should be added into water in order to reduce SAR value (Dogan 1979).

The chemical composition of surface water varies according to the soil type, which is flowing on it, seasons, the concentration of other water mixed inside and suspension carried by water in spring (Gamsiz and Agacik 1981).

Yurtsever and Sönmez (1992) suggested that, to determine irrigation water quality, not only chemical analysis but also the amount of water to be consumed should be considered. To decide whether irrigation water quality is suitable, physical properties of soil, salt tolerance of plant, irrigation method, sufficiency of drainage and drainage management should be taken into consideration.

The water quality of Konya Closed Basin main drainage canal was investigated by Bahçeci et al. (1981) and concluded that water quality is better in winter than in summer and in the summer harmful for the soil and plant due to high salinity and boron levels.

From the total of 5.4 million ha, 324 998 ha (6 % of Konya Closed Basin) is desert lands due to insufficient drainage system and excess irrigation in Konya Closed Basin. If these lands are improved, many contributions will be supplied to Turkey's economy (Anonymous, 1988). In Konya Closed Basin, Aksehir and Hotamis Lake waters are very poor quality, Beysehir and Çavusçu Lakes, Apa, Altinapa and May Dams waters are very good quality for irrigation (Zengin and Bayrakli 1992).

In this study, 90 irrigation water samples (15 surfaces + 15 undergrounds) were collected from different parts of Konya Closed Basin in irrigation period as monthly (June, July and August), 1999 to determine their suitability for the irrigation.

MATERIALS AND METHODS

The investigation material covers 90 water samples (15 surfaces + 15 underground = 30 samples x 3 months) collected from 30 different places of Konya Closed Basin in the irrigation season (June, July and August) 1999 (Table 1).

The basin (5.4 million ha; about 7 % of Turkey square measure) is surrounded with Karaca and Pasa Mountains in North, Taurus Mountains in South, Melendiz Mountains in East and Anamas, Sultan and Gavur Mountains in West. The climate is dry and hot in summers and cold and rainy in winter. The Lakes Region and the south of the basin are semi-humid and other places are semi-arid. The average annual relative humidity is 38 %, average temperature is 12.3 ^{o}C. North winds are dominant in the basin, and the vegetative period is 139 days. The first frost date is September 29, while the latest is May 12. Frosty days are 103.3 days in a year (Anonymous 1978). The lowest average annual rainfall (249.3 mm) is around Çumra and Karapinar, the highest (477 mm) is around Beysehir (Munsuz and Ünver 1983, Bayrakli 1995). The Konya Closed Basin is situated 36^{o}51'-39^{o}29' north latitudes and 31^{o}36'-45^{o}52' east longitudes in the Middle Anatolia Region and it is lying down from south to north, from west to east. The altitude varies in range between 940 m and 1550 m. Konya is accepted as cereals store of Turkey and it has smooth and mild slope and formed on old lake sedimentary and volcanic rocks. Wheat, barley, chickpea, sugar beet, potato, onion, grape, apple, melon and watermelon are grown in 2 336 419 ha area (Anonymous 1978).

The water samples were collected in June, July and August, irrigation season, 1999 with polyethylene bottles from inside and flowing places in surface water, and after working of pump a few minutes in underground water. The clean bottles were filled entirely and were carried to the laboratory immediately, in closed bags. The samples kept in the refrigerator were analysed for pH (pH meter), EC (EC meter), Ca^{++} and Mg^{++} (EDTA volumetric titration), Na^{+} and K^{+} (flame photometer), CO_3^{--}, HCO_3^{-} and Cl^{-} (volumetric titration), $SO_4^{--}$and B (spectrophotometer), and from these data RSC, SAR and quality classes were determined according to Gamsiz and Agacik (1981). For the calculation of RSC and SAR; RSC = $(CO_3^{--}+HCO_3^{-})$-$(Ca^{++}+Mg^{++})$ and SAR = $Na^{+}[(Ca^{++}+Mg^{++})^{-2}]^{-1}$ formulas were used respectively, and the quality classes (C_xS_x) were determined according to the Diagram of Salinity Laboratory of USA (Gamsiz and Agacik 1981) and analysis results were given as the average of three months.

RESULTS AND DISCUSSION

Surface Irrigation Waters

The chemical analyses of surface irrigation waters were given in Table 2. The pH values of surface irrigation water samples were found between 7.00 (Ivriz Dam) and 8.70 (May Dam). Average pH value was 7.93. The pH values ranged normal (6.50-8.50) limits (Anonymous 1991), except May Dam sample. The pH value of Beysehir Lake water was determined as maximum limit (8.50). The pH value of same lake water was reported as 7.80 in July 1991 (Zengin and Bayrakli 1992). There was an increment in pH value (an increasing for CO_3^{--} and a decreasing for HCO_3^{-}) through eight years. In this period, no problem for RSC (Residual Sodium Carbonate) was found. The carbonate and SAR (Sodium Adsorption Ratio) values were below the maximum limits. The high pH value (8.70) for May Dam water was found as 'high' (8.11) in July 1991 (Zengin and Bayrakli 1992).

The EC (Electrical Conductivity) values of samples ranged from 70 µmhos cm^{-1} being Class I (C_1) for Evliyatekke Pond to 940 µmhos cm^{-1} being Class III (C_3) for Çayhan Pond. The average EC value was found as 390 µmhos cm^{-1} (C_2; 250-750 µmhos cm^{-1})

(Anonymous, 1991). The four samples were Class I (C_1), and eleven were Class II (C_2) according to the salinity hazard. Only Çayhan Pond water was third class (C_3). It should be noted that while using this type of waters (C_3) in irrigation, drainage system should be worked properly and tolerant plants to salts should be grown.

On the other hand, the B (boron) contents of surface irrigation water samples differed between 0.00 mg L^{-1} (Ayranci Dam, May Dam and Evliyatekke Pond) and 0.85 mg L^{-1} (Çavusçu Lake). Average value was 0.28 mg L^{-1}. The Çayhan Pond, Apa Dam, Beysehir Lake and Çavusçu Lake waters were Class 2 and the others were Class 1 (Anonymous 1991) for B contents.

Table 1. Some information on the given irrigation water samples

Surface Irrigation Waters					
No	**Sample Names**	**Places**	**Distances to Konya (km)**	**Altitudes (m)**	**Water Volumes (hm^3)**
1	**Cihanbeyli Pond**	Cihanbeyli District	100	974	7
2	**Mamasin Dam**	Aksaray Province	150	1107	137.6
3	**Çayhan Pond**	Eregli District	180	1311	3.83
4	**Ivriz Dam**	Eregli District	165	1315	2.5
5	**Ayranci Dam**	Ayranci District	100	1193	29.2
6	**Gödet Dam**	Karaman Province	110	1161	142.2
7	**Akören Pond**	Akören District	70	1135	2.5
8	**Apa Dam**	Çumra District	65	1070	25.2
9	**May Dam**	Çumra District	59	1058	33.4
10	**Evliyatekke Pond**	Evliyatekke Village	40	1950	1
11	**Beysehir Lake**	Beysehir District	90	1121	3250
12	**Doganhisar Pond**	Doganhisar District	150	1503	1.68
13	**Sille Dam**	Sille Village	15	1267	2.45
14	**Osmancik Pond**	Kadinhani District	70	1234	1.38
15	**Çavusçu Lake**	Ilgin District	75	1315	26

Underground Irrigation Waters					
No	**Sample Names**	**Places**	**Distances to Konya (km)**	**Flows ($L\ s^{-1}$)**	**Well Depths (m)**
1	**Çengilti**	Çengilti Village	30	46	176
2	**Emirgazi**	Emirgazi District	130	20	170
3	**Beyören**	Beyören Village	145	35	141
4	**Sazlipinar**	Sazlipinar Village	65	52	150
5	**Küçükaslama**	Küçükaslama Village	83	60	150
6	**Ürünlü**	Ürünlü Village	60	60	121
7	**Içeri Çumra**	Içeri Çumra District	50	50	145
8	**Apasaraycik**	Apasaraycik Village	65	35	120
9	**Ahmediye**	Ahmediye Village	60	45	135
10	**Yaylacik**	Yaylacik Village	60	61	125
1	**Hasanseyh**	Hasanseyh Village	50	18	150
12	**Çukuragil**	Çukuragil Village	60	10	124
13	**Argithani**	Argithani Village	90	52	146
14	**Orhaniye**	Orhaniye Village	65	45	96
15	**Hacimehmetli**	Hacimehmetli Village	65	21	88

The SAR (Sodium Adsorption Ratio) values of water samples changed between 0.00 (S_1; Akören Pond, May Dam, Evliyatekke Pond) and 1.40 (S_1; Çayhan Pond). Average value was evaluated as 0.26. All of surface irrigation water samples were Class I (< 10; Anonymous 1991) in view of SAR. In addition, all of surface irrigation water samples were evaluated for RSC (Residual Sodium Carbonate) as 0.00 me L^{-1} and that's why they were Class I (< 1.25 me L^{-1}; Anonymous, 1991).

The surface water quality classes ranged from C_1S_1 (Ivriz and May Dam, Akören and Evliyatekke Ponds) to C_3S_1 (Çayhan Pond). The four samples were C_1S_1, ten samples were C_2S_1 and one sample was C_3S_1 quality class and they have no problem for salinity and sodicity. Only Çayhan Pond water was C_3S_1 quality class, that is to say class 3 (750-2250 µmhos cm^{-1}) salty water. Drainage must be supplied and tolerant plants to salt must be grown in C_3 class water use in irrigation.

Underground Irrigation Waters

The chemical analyses of underground irrigation waters were given in Table 3. The pH of underground irrigation water samples varied between 6.50 (Içeri Çumra) and 7.90 (Çengilti). Average pH value was 7.33 and all the pH values were between standard (6.50-8.50) limits (Anonymous 1991).

The EC (Electrical Conductivity) of samples changed between 270 µmhos cm^{-1} (Yaylacik) and 7770 µmhos cm^{-1} (Sazlipinar). Average value was 1326 µmhos cm^{-1} (C_3). The eight samples were C_2, five samples were C_3 and two samples were C_4 class in the 15 underground irrigation waters. The Sazlipinar and Küçükaslama underground water were C_4 class. Drainage must be supplied and tolerant plants to salt must be grown in C_4 class irrigation water use.

The Cl^- (chlorine) contents of samples differed between 0.30 me L^{-1} (Yaylacik) and 31.50 me L^{-1} (Sazlipinar) and average value was 3.48 me L^{-1}. The Çengilti water was Class 2, Sazlipinar water was Class 5 and the others were Class 1.

The SO_4^{--} (sulphate) concentrations of samples changed between 0.10 me L^{1} (Ahmediye and Yaylacik) and 36.50 me L^{-1} (Sazlipinar). Average data was 3.84 me L^{-1}. The Sazlipinar water was Class 5 and Küçükaslama water was Class 3 and the others were Class 1.

On the other hand, the B (boron) contents of underground irrigation water samples were found between 0.00 mg L^{1} (Yaylacik, Hasanseyh and Çukuragil) and 0.96 mg L^{-1} (Sazlipinar). Average value was 0.21 mg L^{1}. All of underground water was Class 1, except the Sazlipinar water (Class 2) for B contents.

The SAR (Sodium Adsorption Ratio) values of water samples varied in 0.20 (Içeri Çumra, Apasaraycik and Yaylacik) and 1.60 (Emirgazi, Küçükaslama and Orhangazi). Average value was 1.02. All of underground water samples were Class I (< 10; Anonymous 1991) for SAR.

In addition, the RSC (Residual Sodium Carbonate) values were evaluated as 0.00 me L^{-1}, except Argithani underground water (0.30 me L^{-1}). Average value was 0.02 me L^{1} and that's why they were Class I (< 2.5 me L^{-1} Anonymous 1991).

The quality classes of underground water changed between C_2S_1 (Içeri Çumra, Apasarycik, Ahmediye, Yaylacik, Hasanseyh, Çukuragil and Argithani) and C_4S_1 (Sazlipinar and Küçükaslama). The eight samples were C_2S_1, five samples were C_3S_1 and two samples were C_4S_1 quality classes and they had no problem for salinity and sodicity, except C_3S_1 and C_4S_1 samples (Anonymous, 1991). Only Sazlipinar and Küçükaslama waters were C_4S_1 quality classes, that is to say, class 4 (2250-4000 µmhos cm^{-1}) salty water. Drainage must be supplied and tolerant plants to salt must be grown in C_4 water use in irrigation.

Conclusion; one surface irrigation water sample was found unsuitable due to high pH value. Water quality classes say; Class I: excellent, Class II: good, Class III: doubtful and Class IV: unsuitable. All surface irrigation water samples were evaluated as convenient in irrigation in regard EC, B, SAR and RSC. The analysis findings of Çayhan Pond were found more than those of other surface irrigation waters. From underground waters, Sazlipinar and Küçükaslama samples were determined unsuitable because of very high EC values. This water has no B, SAR and RSC problems, but it must not be used because of its very high salinity, or it required careful drainage and wash water and growing resistant plants for salt. pH and B values of surface waters were more than those of underground waters, and EC, total cations, total anions, SAR, RSC and quality class values of surface water were less than those of underground waters.

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Table 2. Chemical analyses of surface irrigation waters collected from different places of Konya Closed Basin

Samples	**pH**	**ECx10^6**	**Cations (me L^{-1})**					**Anions (me L^{-1})**					**Mic. El.**	**SAR**	**RSC**	**Qua. Class**
		(25 ^{o}C)	**Ca^{++}**	**Mg^{++}**	**Na^{+}**	**K^{+}**	**Total**	**CO_3^{--}**	**HCO_3^{-}**	**Cl^{-}**	**SO_4^{--}**	**Total**	**mg L^{-1} B**		**me L^{-1}**	
1. Cihanbeyli Pond	7.50	680	3.50	3.00	0.50	0.04	7.04	0.00	6.00	0.70	0.40	7.10	0.45	0.30	0.00	C_2S_1
2. Mamasin Dam	7.90	490	2.50	2.20	0.50	0.02	5.22	0.00	4.40	0.40	0.30	5.10	0.15	0.30	0.00	C_2S_1
3. Çayhan Pond	7.30	940	3.80	3.20	2.60	0.13	9.73	0.00	5.50	2.00	2.30	9.80	0.60	1.40	0.00	C_3S_1
4. Ivriz Dam	7.00	220	1.30	0.80	0.20	0.01	2.31	0.00	2.00	0.20	0.10	2.30	0.10	0.20	0.00	C_1S_1
5. Ayranci Dam	7.60	365	1.90	1.70	0.20	0.02	3.82	0.00	3.30	0.40	0.10	3.80	0.00	0.10	0.00	C_2S_1
6. Gödet Dam	7.50	500	2.70	2.20	0.30	0.02	5.22	0.00	4.50	0.60	0.20	5.30	0.15	0.20	0.00	C_2S_1
7. Akören Pond	8.30	135	0.90	0.50	0.00	0.04	1.44	0.30	0.80	0.30	0.00	1.40	0.05	0.00	0.00	C_1S_1
8. Apa Dam	8.40	420	2.30	1.60	0.40	0.03	4.33	0.40	2.90	0.60	0.10	4.00	0.70	0.28	0.00	C_2S_1
9. May Dam	8.70	115	0.50	0.70	0.00	0.03	1.23	0.30	0.70	0.20	0.00	1.20	0.00	0.00	0.00	C_1S_1
10. Evliyatekke P.	8.30	70	0.50	0.30	0.00	0.01	0.81	0.30	0.30	0.20	0.00	0.80	0.00	0.00	0.00	C_1S_1
11. Beysehir Lake	8.50	310	1.60	1.40	0.20	0.03	3.23	0.60	2.10	0.50	0.10	3.30	0.80	0.16	0.00	C_2S_1
12. Doganhisar P.	7.80	420	2.30	1.70	0.40	0.03	4.43	0.00	3.50	0.60	0.30	4.40	0.15	0.30	0.00	C_2S_1
13. Sille Dam	8.20	425	2.50	1.50	0.40	0.04	4.44	0.20	3.60	0.60	0.10	4.50	0.10	0.30	0.00	C_2S_1
14. Osmancik P.	8.00	320	1.80	1.40	0.20	0.01	3.41	0.00	3.00	0.40	0.10	3.50	0.20	0.20	0.00	C_2S_1
15. Çavusçu Lake	8.00	445	2.40	1.80	0.30	0.05	4.55	0.00	3.80	0.60	0.20	4.60	0.85	0.21	0.00	C_2S_1
Minimum	7.00	70	0.50	0.30	0.00	0.01	0.81	0.00	0.30	0.20	0.00	0.80	0.00	0.00	0.00	C_1S_1
Maximum	8.70	940	3.80	3.20	2.60	0.13	9.73	0.60	6.00	2.00	2.30	9.80	0.85	1.40	0.00	C_2S_1
Average	7.93	390	1.96	1.60	0.41	0.03	4.08	0.14	3.14	0.55	0.28	4.07	0.28	0.26	0.00	C_2S_1

Table 3. Chemical analyses of underground irrigation waters collected from different places of Konya Closed Basin

Samples	**Ph**	**ECx10^6**	**Cations (me L^{-1})**					**Anions (me L^{-1})**					**Mic. El.**	**SAR**	**RSC**	**Qua.**
		(25 ^{o}C)	**Ca^{++}**	**Mg^{++}**	**Na^{+}**	**K^{+}**	**Total**	**CO_3^{--}**	**HCO_3^{-}**	**Cl^{-}**	**SO_4^{--}**	**Total**	**mg L^{-1} B**		**me L^{-1}**	**Class**
1. Çengilti	7.90	1975	8.10	5.00	6.00	1.13	20.23	0.00	11.20	5.50	3.40	20.10	0.05	2.30	0.00	C_3S_1
2. Emirgazi	6.90	800	3.50	2.10	2.60	0.07	8.27	0.00	4.00	2.10	2.30	8.40	0.35	1.60	0.00	C_3S_1
3. Beyören	7.20	770	4.10	2.90	1.10	0.10	8.20	0.00	7.00	0.70	0.30	8.00	0.10	0.60	0.00	C_3S_1
4. Sazlipinar	7.70	7770	42.20	17.80	19.00	0.50	79.50	0.00	11.40	31.50	36.50	79.40	0.96	3.50	0.00	C_4S_1
5. Küçükaslama	7.20	2495	12.30	8.00	5.00	0.24	25.54	0.00	14.40	3.50	7.60	25.50	0.42	1.60	0.00	C_4S_1
6. Ürünlü	7.30	730	3.90	3.10	0.90	0.08	7.98	0.00	6.10	1.10	0.60	7.80	0.05	0.50	0.00	C_2S_1
7. Içeri Çumra	6.50	625	4.20	2.00	0.40	0.03	6.63	0.00	5.10	0.70	0.80	6.60	0.12	0.20	0.00	C_2S_1
8. Apasaraycik	7.60	580	3.60	2.10	0.30	0.05	6.05	0.00	5.10	0.70	0.30	6.10	0.10	0.20	0.00	C_2S_1
9. Ahmediye	7.50	440	2.50	1.70	0.40	0.03	4.63	0.00	4.00	0.50	0.10	4.60	0.25	0.30	0.00	C_2S_1
10. Yaylacik	6.90	270	1.60	1.00	0.20	0.02	2.82	0.00	2.50	0.30	0.10	2.90	0.00	0.20	0.00	C_2S_1
11. Hasanseyh	7.60	510	3.30	1.60	0.40	0.04	5.34	0.00	4.60	0.50	0.30	5.40	0.00	0.30	0.00	C_2S_1
12. Çukuragil	7.60	600	3.10	2.30	1.00	0.01	6.41	0.00	3.90	1.80	0.60	6.30	0.00	0.60	0.00	C_2S_1
13. Argithani	7.50	605	3.40	1.90	1.20	0.08	6.58	0.00	5.60	0.60	0.30	6.50	0.15	0.73	0.30	C_2S_1
14. Orhaniye	7.20	890	3.90	2.30	2.80	0.04	9.04	0.00	5.50	1.40	1.50	8.40	0.20	1.60	0.00	C_3S_1
15. Hacimehmetli	7.40	840	4.80	1.90	2.20	0.07	8.97	0.00	4.30	1.40	3.00	8.70	0.46	1.20	0.00	C_3S_1
Minimum	6.5	270	1.60	1.00	0.20	0.01	2.82	0.00	2.50	0.30	0.10	2.90	0.00	0.20	0.00	C_2S_1
Maximum	7.90	7770	42.20	17.80	19.00	1.13	79.50	0.00	14.40	31.50	36.50	79.40	0.96	1.60	0.30	C_4S_1
Average	7.33	1326	6.96	3.71	2.90	0.16	13.74	0.00	6.38	3.48	3.84	13.64	0.21	1.02	0.02	C_3S_1