# Assessment of Irrigation Water Quality Parameters of Water Resources used to Irrigate Agricultural Fields of Alemdar Neighborhood of Konya Çumra District

Ahmet Melih YILMAZ
Selçuk Univ, Agricultural Faculty, Agricultural Structures and Irrigation Department KONYA / TURKEY

Received:- 14 August 2025/ Revised:- 20 August 2025/ Accepted:- 25 August 2025/ Published: 31-08-2025


***Abstract***— *This study was conducted to assess water quality parameters of water samples taken from irrigation wells used to irrigate agricultural fields of Alemdar Neighborhood of Konya-Çumra District. Water samples were taken in June, July, August, September and October. The pH values of irrigation water samples varied between 7.11 – 8.12, EC values varied between 580 - 1150 µmhos/cm. Irrigation water salinity classes were identified as $C_2S_1$ (moderately saline - low alkaline) and $C_3S_1$ (highly saline - low alkaline). Boron concentration of all samples was below the threshold boron level of 0.67 ppm.*

***Keywords*— *Irrigation, irrigation water quality, saline irrigation water, boron.***

## I. INTRODUCTION

Water quality and soil salinity are among the most important issues to consider in sustainable agricultural production. In recent years, water resources have been under great pressure due to both the negative effects of climate change and increasing water demands. Groundwater resources, which play a crucial role in water resources, are deteriorating both in quality and quantity over time. Such a case is particularly evident in basins such as the Konya Closed Basin. Irrigation carries dissolved salts into the soil. Depending on the characteristics of the water source, salinity and alkalinity problems may arise over time in irrigated areas, and if no measures are taken, these problems can reach levels that restrict or eliminate agricultural production **[1].**

**[2]** took monthly water samples from the surface and different depths in three sampling points of Boztepe Recai Kutan Reservoir Lake in Malatya province to determine the water quality of the reservoir lake and analyzed temperature, pH, dissolved oxygen, and electrical conductivity parameters and indicated water quality class of the reservoir lake as Class II (good quality water).

**[3]** indicated that in modern irrigation systems, the quality of irrigation water is as important as the amount of irrigation water, irrigation time, and irrigation method. When sufficient and good-quality water is not available, water that is unsuitable for irrigation is used. This increases the salinity problem in the soil. Therefore, in order to evaluate the water quality in the ponds used for irrigation in Hakkari province, water samples were taken from 10 irrigation ponds in June, July, August, and September. The water samples were analyzed for electrical conductivity (EC), pH, anions, and cations ($Ca^{2+}$, $Mg^{2+}$, $K^{+}$, $Na^{+}$, $SO_4^{2-}$, $NO_3^{2-}$, $CO_3^{2-}$, $HCO_3^{-}$, and $Cl^{-}$). Additionally, using the obtained data, the Sodium Adsorption Ratio (SAR), Residual Sodium Carbonate (RSC), and Sodium Percentage (% Na) values were calculated. At the end of the study, it was determined that the pH, EC, SAR, RSC, and % Na values of the irrigation pond waters did not exceed the threshold values, but the $Mg^{+2}$ and $K^{+}$ values of the pond water in the Kanatlı area of Akçalı Village and the $K^{+}$ value of the pond water in the Şişer area of Kırıkdağ Village exceeded the threshold values.

**[4]** conducted a study to evaluate the quality of water samples taken from irrigation wells used to irrigate agricultural fields in the Hatunsaray neighborhood of Meram district, Konya province. Researchers took water samples from the wells used for irrigation and also collected soil samples from the agricultural fields irrigated by these wells at depths of 0-30, 30-60, and 60-90 cm. It was determined that most of the soils in the region were loamy (L) and clay-loam (CL) in texture, with soil pH values ranging from 7.94 to 9.10 and EC values ranging from 242 to 857 µmhos/cm. EC values of the water samples ranged from 198 to 772 µmhos/cm, pH values ranged from 6.91 to 8.38, and water salinity class was identified as $C_2S_1$ (moderately saline - low alkaline). It was recommended that drainage systems should be constructed to prevent salinity problems in agricultural areas and the periodic maintenance and repair of existing drainage channels should be carried out and the necessary cultural measures should be taken to prevent potential salinity problems in the coming years.

**[5]** conducted a study in the Biga Plain of Çanakkale province to analyze water samples taken from 20 wells for electrical conductivity (EC), pH, potassium (K), calcium (Ca), magnesium (Mg), Sodium (Na), Carbonate ($CO_3$), Bicarbonate ($HCO_3$), Chloride (Cl), Sulfate ($SO_4$), Nitrate ($NO_3$), and Boron (B) parameters. When classified according to the Water Pollution Control Regulation (SKKY) Classification System and considering the salinity parameter, 11 of the 20 wells were classified as second class, while the others were classified as first class. The study found that, apart from nitrate pollution in groundwater, no significant problems had yet emerged in the study area.

**[6]** conducted a study in the Isparta Plain to examine the quality of irrigation water samples taken from 21 groundwater wells and found that the water quality in some of the wells was classified as $C_3S_1$ (highly saline - low alkaline), while the water quality in other wells was classified as $C_2S_1$ (moderately saline - low alkaline).

**[7]** conducted a study to determine the irrigation water quality of water sources used in some agricultural lands in the Mersin-Mezitli district and the salinity level of agricultural lands irrigated with these waters. It was determined the pH values of irrigation water samples taken in July, August, September, and October ranged from 7.05 to 8.26, and the EC values ranged from 292 to 1103 µmhos/cm, the water samples were classified as $C_2S_1$ and $C_3S_1$ irrigation water according to the US Salinity Laboratory Classification System, falling into the medium and high salinity irrigation water categories, while boron levels were found to be below the optimal limit of 0.67 ppm in all samples. Additionally, the soils in the study area were found to be clay, loamy, and clay-loam in texture with pH values ranging from 7.38 to 7.95 and EC values ranging from 1985 to 3180 µmhos/cm in August. The soil salinity was found to be below the soil salinity threshold value of 4000 µmhos/cm. It was determined that there were no significant differences in quality or quantity in the water samples throughout the irrigation period (July-October), and that the soil samples did not pose any problems in terms of salinity and boron under the current conditions.

**[8]** conducted a study to determine the impact of domestic and industrial wastes on the Nilüfer River. Researchers collected wastewater samples from the discharge points of five wastewater treatment plants discharging into the Nilüfer River and from the streams into which these plants discharge during four different periods between August 2013 – May 2014. The results of the study showed that the water quality parameters of the Nilüfer River and some of the wastewater treatment plants discharging into the Nilüfer River varied depending on the period. Based on the classification made considering EC and SAR, the water samples were categorized into $C_2S_1$ - $C_4S_4$ classes, and that the water parameters of the Nilüfer River before and after discharge showed that the wastewater discharged from the treatment plants had a negative impact on the Nilüfer River, particularly in terms of pH, EC, ammonium, phosphorus, sulfate, boron, and chlorine values.

**[9]** conducted a study in the Sultanhisar district of Aydın Province and found that the quality of water used for irrigation varied between $C_2S_1$ and $C_3S_1$ classes over time, that the canal water used affected fruit quality, and that the boron content of these waters was higher than that of the control group plants.

**[10]** selected a total of 17 sampling sites along the Awash River and its tributaries and conducted sampling four times a year in different seasons to assess the water quality of the Awash River and its tributaries. Researchers assessed the overall water quality and suitability for irrigation using numerous water quality parameters such as pH, EC, SAR, RSC, $Na^+$, $K^+$, $Ca^{++}$ , $Mg^{++}$, $CO_3^{2-}$, $HCO_3^-$, and $Cl^-$. It was determined that all quality parameters in Lake Beseka exceeded the maximum permissible limits for irrigation, the physicochemical characteristics of the Awash River showed variations in different water quality parameters across different sites. Only the pH and SAR of Beseka Lake and Meteka hot spring water exceeded the permitted limit, and the EC values in Mojo, Wonji, Beseka, Melkasedi, Werer, Ambash, Meteka, and Meteka hot springs showed medium-high salinity values, while the RSC was very high. It was recommended that wastewater treatment plants should be constructed for industries to improve water quality.

Soil salinization and alkalinity are common processes that characterize arid areas in particular. These processes can be attributed to natural conditions or anthropogenic activities. Natural factors include climate, lithology, topography, and pedology, while human-induced factors are mostly related to agricultural land use and, in particular, irrigation. Over time, the extent of saline, alkaline, and saline-alkaline agricultural areas has increased, leading to accelerated land degradation and desertification, reduced agricultural productivity, and ultimately jeopardizing environmental and food security. Mapping and monitoring saline soils is an important management tool aimed at determining the extent and severity of salinization processes. Recent advances in remote sensing methods have increased the effectiveness of mapping and monitoring processes of saline soils. Knowledge on the prevention, reduction, and improvement of soil salinity and alkalinity has increased significantly over time **[11].**

## II. MATERIAL AND METHODS

Water samples were taken from 20 irrigation wells used to irrigate agricultural fields of Alemdar Neighborhood of Çumra District of Konya province in June, July, August, September and October.

Konya Province is located in the southern part of the Central Anatolia Region. While most of its land consists of high plateaus, the southern and southwestern parts of Konya Province are in the Mediterranean Region. Geographically, Konya is located between 36°41' and 39°16' north latitudes and 31°14' and 34°26' east longitudes **[12].** It has an area of 38,257 km² (excluding lakes). It is the largest province of Turkey in terms of area. The average elevation is 1,016 m **[13].**

In the higher elevations of Konya Province, where a continental climate prevails, winters are cold and rainy, while summers are hot during the day and cool at night. The temperature difference between night and day is significant, and precipitation is quite low **[14].** Convective rainfall occurs in the spring, and most of annual precipitations fall during this season. The annual average rainfall in the region is 329 mm. Due to the varying topography of Konya Province, the average annual rainfall amounts also differ **[15].** While the monthly average temperature values in the region range from -0.2 °C to 23.5 °C, a steady increase in temperature has been observed when long-term temperature changes are examined. Evaporation values reach their highest levels during the summer months. The evaporation value in July is 280 mm, with an annual total of 952 mm **[12].**

The district of Çumra, located 43 km from the center of Konya, is situated on the Konya-Karaman highway and railway route. The district is bordered by Karatay to the north, Karapınar to the east, Akören and Meram to the west, Bozkır and Güneysınır districts to the southwest, and province of Karaman to the southeast. It is generally located between $37^0$-$38^0$ east longitudes and $33^0$-$34^0$ north latitudes. The district has an area of 2,330 km², with 90% of the land being flat and 10% consisting of mountainous and forested areas. The district's elevation above sea level is 1,013 meters, and the highest point in the region is Karadağ Mountain, which separates Çumra from Karaman at an elevation of 2,288 meters. The Çarşamba River, Apa Dam Lake, and Hotamış Lake, which will be replenished with water through the Blue Tunnel Project, are the district's most important water resources **[16].**

The climate in Çumra and its surroundings is cold and snowy in winter and hot and dry in summer. Autumn and spring are the rainy seasons. However, in recent years, parallel to on-going climate change in Turkiye, snowfall in winter has decreased significantly. The Çumra Meteorological Station was established in 1927 and is the first meteorological station established in the Konya region. The lowest temperature in Çumra was recorded at -26.8 °C in 1964, and the highest temperature was 39.9 °C in 2000. The highest rainfall in the district was 50.1 kg/m² in 2003, and the highest snowfall was 52 cm in 1976. The average temperature of the district is 11.27 °C. The soil structure of Çumra is diverse. The alluvial soils that cover a large part of the plain are quite fertile and rich in minerals. However, these soils have problems such as salinity and wind erosion. The plain has a flat topography. Fifty percent of the land is flat, 17% is slightly sloped, 14% is moderately sloped, 13% is steep, and 6% is highly steep.

Approximately 114,000 hectares of land are used for agriculture in the Çumra Plain. Approximately 80,000 hectares of this area are used for irrigated agriculture, while the remaining area is used for dry farming. The most commonly grown crops in Çumra are wheat, barley, sugar beet, dry beans, and chickpeas.

The research area, Alemdar neighborhood, is located 9 km from Çumra and 51 km from Konya. The location of the research area is shown in Figure 1.


**FIGURE 1: Location of the research site**

Monthly water samples were taken regularly for five months during the irrigation period (June-October) from 20 irrigation water wells in irrigated agricultural fields of Alemdar Neighborhood of Çumra District. The pH and EC readings were taken, and in August, analyses were conducted to determine soluble cations (Ca, Mg, Na, K) and anions ($CO_3$, $HCO_3$, Cl, and $SO_4$) in the water, as well as boron content. Analysis results were used to calculate %Na, SAR, RSC, and irrigation water class.

## III. RESULT AND DISCUSSION

Water samples were taken from the water resources (wells) used for irrigation of the research area once a month for five months (June, July, August, September, and October) during the irrigation season.

The pH and EC values of the irrigation water samples taken in June, July, August, September, and October, are presented in Table 1. In June, the pH values of the irrigation water samples ranged from 7.15 to 8.00, and the EC values ranged from 580 to 1100 µmhos/cm. In July, the pH values of the irrigation water ranged from 7.35 to 8.05, and the EC values ranged from 690 to 1095 µmhos/cm. In August; the pH values of irrigation water samples were between 7.48 - 8.12, and the EC values were between 810 - 1150 µmhos/cm. In September; the pH values of irrigation water were between 7.33 - 8.09, and the EC values were between 775 - 1040 µmhos/cm. In October, the pH values of the irrigation water samples were between 7.11 – 7.91, and the EC values were between 751 - 935 µmhos/cm. The EC values of irrigation water samples taken from the region in June, July, August, September, October and sample numbers are presented in Figures 2, 3, 4, 5, and 6.

In June, the highest salinity values were seen in samples 16 and 17, while samples 4, 6, 7, 9, 14, 15, 16, 17, 18, 19, and 20 had salinity levels above the threshold salinity level of 750 µmhos/cm. The remaining samples had salinity levels below the threshold salinity level of 750 µmhos/cm, making them more suitable for use in irrigating fields. In July, the highest salinity values were seen in samples 15 and 17. All other samples, except for samples 1, 2, 5, 10, and 11, exceeded the threshold value (750 µmhos/cm). It can be stated that these samples are not suitable for irrigation purposes in terms of salinity. In August, the highest salinity values were seen in samples 7, 14, 15, 16, and 17. All samples exceeded the threshold value (750 µmhos/cm), and it can be said that they are not suitable for use in irrigating fields in terms of salinity. In September, the highest salinity values were seen in samples 7 and 14, and all samples exceeded the threshold salinity level of 750 µmhos/cm, making them unsuitable for use in irrigating fields in terms of salinity. In October, the highest salinity values were seen in samples 7, 14, 15, and 17, and all samples exceeded the threshold value of 750 µmhos/cm, making them unsuitable for irrigation purposes.

The chemical analysis results of irrigation water samples for August are given in Table 2. The pH values of the irrigation waters ranged from 7.48 to 8.12, the EC values ranged from 810 to 1150 µmhos/cm, and the boron values were below the optimal limit of 0.67 ppm in all samples. In terms of soluble anions and cations in the water, Ca was the dominant cation and $SO_4$ was the dominant anions. Sodium Adsorption Ratios (SAR) ranged from 0.51 to 1.29, while %Na values ranged from 10.22 to 23.91. Water samples from August were classified as $C_3S_1$ irrigation water according to the US Salinity Laboratory Classification System.

In terms of boron values of the irrigation water samples in Table 2, all samples were below the safe boron value (0.7 ppm), and it can be stated that there will be no boron-related issues in August irrigation.

**TABLE 1**
**THE pH AND EC ANALYSIS RESULTS OF IRRIGATION WATER SAMPLES TAKEN IN JUNE, JULY, AUGUST, SEPTEMBER AND OCTOBER**

| Sample No | June | | July | | August | | September | | October | |
|---|---|---|---|---|---|---|---|---|---|---|
| | pH | EC x $10^6$ µmhos/cm 25 ºC | pH | EC x $10^6$ µmhos/cm 25 ºC | pH | EC x $10^6$ µmhos/cm 25 ºC | pH | EC x $10^6$ µmhos/cm 25 ºC | pH | EC x $10^6$ µmhos/cm 25 ºC |
| 1 | 7,79 | 625 | 7,51 | 740 | 7,80 | 810 | 8,09 | 775 | 7,75 | 751 |
| 2 | 7,45 | 580 | 7,66 | 735 | 8,02 | 850 | 7,78 | 805 | 7,60 | 795 |
| 3 | 7,85 | 750 | 7,90 | 800 | 8,05 | 860 | 7,80 | 800 | 7,80 | 768 |
| 4 | 7,61 | 790 | 7,84 | 855 | 8,09 | 901 | 7,90 | 842 | 7,63 | 801 |
| 5 | 7,50 | 695 | 7,60 | 750 | 7,98 | 849 | 7,76 | 807 | 7,55 | 803 |
| 6 | 7,29 | 951 | 7,35 | 1010 | 7,52 | 1045 | 7,45 | 976 | 7,40 | 900 |
| 7 | 7,38 | 970 | 7,42 | 1080 | 7,48 | 1100 | 7,55 | 1000 | 7,69 | 915 |
| 8 | 7,65 | 695 | 7,90 | 840 | 7,95 | 960 | 7,71 | 895 | 7,78 | 826 |
| 9 | 7,66 | 851 | 7,85 | 1020 | 7,90 | 1050 | 7,75 | 953 | 7,91 | 855 |
| 10 | 7,50 | 690 | 7,65 | 690 | 7,65 | 841 | 7,50 | 810 | 7,60 | 765 |
| 11 | 7,77 | 645 | 7,94 | 750 | 7,99 | 910 | 7,63 | 860 | 7,50 | 772 |
| 12 | 8,00 | 750 | 8,05 | 895 | 8,02 | 1010 | 7,70 | 920 | 7,45 | 810 |
| 13 | 7,95 | 655 | 8,00 | 810 | 8,12 | 870 | 7,90 | 840 | 7,74 | 765 |
| 14 | 7,30 | 1010 | 7,54 | 1070 | 7,65 | 1120 | 7,50 | 1040 | 7,11 | 935 |
| 15 | 7,15 | 1070 | 7,35 | 1095 | 7,48 | 1150 | 7,43 | 995 | 7,25 | 918 |
| 16 | 7,41 | 1100 | 7,66 | 1080 | 7,91 | 1130 | 7,74 | 970 | 7,63 | 885 |
| 17 | 7,29 | 1090 | 7,53 | 1095 | 7,55 | 1110 | 7,33 | 965 | 7,56 | 910 |
| 18 | 7,35 | 1075 | 7,43 | 1045 | 7,49 | 1075 | 7,37 | 910 | 7,69 | 880 |
| 19 | 7,77 | 980 | 7,95 | 1005 | 7,91 | 1025 | 7,65 | 905 | 7,65 | 795 |
| 20 | 7,51 | 1000 | 7,78 | 995 | 7,90 | 1000 | 7,80 | 900 | 7,85 | 790 |

**TABLE 2**
**CHEMICAL ANALYSIS RESULTS OF THE IRRIGATION WATER SAMPLES TAKEN IN AUGUST**

| Sample No | pH | ECx10$^6$ µmos/cm 25 ºC | Water-Soluble | | | | | | | | | | RSC | SAR | %Na | Irrigation Water Class | Boron (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cations (me/l) | | | | | Anions (me/l) | | | | | | | | | |
| | | | $Na^+$ | $K^+$ | $Ca^{+2}$ | $Mg^{+2}$ | Total | $CO_3^{-2}$ | $HCO_3^-$ | $Cl^-$ | $SO_4^{-2}$ | Total | | | | | |
| 1 | 7,80 | 810 | 1,65 | 0,22 | 3,88 | 2,45 | 8,20 | 0,00 | 1,71 | 2,95 | 3,59 | 8,25 | - | 0,93 | 20,12 | $C_3S_1$ | <0,67 |
| **2** | 8,02 | 850 | 1,59 | 0,28 | 4,21 | 2,69 | 8,70 | 0,00 | 1,40 | 2,89 | 4,36 | 8,65 | - | 0,85 | 18,28 | $C_3S_1$ | <0,67 |
| 3 | 8,05 | 860 | 1,47 | 0,33 | 3,94 | 2,91 | 8,65 | 0,00 | 1,61 | 3,21 | 3,88 | 8,70 | - | 0,79 | 16,99 | $C_3S_1$ | <0,67 |
| 4 | 8,09 | 901 | 1,21 | 0,18 | 4,84 | 2,77 | 9,00 | 0,00 | 2,01 | 3,45 | 3,64 | 9,10 | - | 0,62 | 13,44 | $C_3S_1$ | <0,67 |
| **5** | 7,98 | 849 | 1,14 | 0,16 | 4,65 | 2,80 | 8,75 | 0,00 | 1,95 | 3,54 | 3,11 | 8,60 | - | 0,59 | 13,03 | $C_3S_1$ | <0,67 |
| **6** | 7,52 | 1045 | 2,10 | 0,35 | 4,25 | 4,00 | 10,70 | 0,00 | 2,01 | 3,88 | 4,66 | 10,55 | - | 1,03 | 19,63 | $C_3S_1$ | <0,67 |
| **7** | 7,48 | 1100 | 1,15 | 0,95 | 6,21 | 2,94 | 11,25 | 0,00 | 1,60 | 3,40 | 6,00 | 11,00 | - | 0,54 | 10,22 | $C_3S_1$ | <0,67 |
| **8** | 7,95 | 960 | 1,08 | 0,08 | 4,44 | 4,25 | 9,85 | 0,00 | 0,95 | 4,06 | 4,89 | 9,90 | - | 0,52 | 10,96 | $C_3S_1$ | <0,67 |
| **9** | 7,90 | 1050 | 2,57 | 0,15 | 4,29 | 3,74 | 10,75 | 0,00 | 0,64 | 5,25 | 4,91 | 10,80 | - | 1,29 | 23,91 | $C_3S_1$ | <0,67 |
| **10** | 7,65 | 841 | 1,41 | 0,08 | 3,88 | 3,13 | 8,50 | 0,00 | 0,58 | 3,41 | 3,39 | 8,60 | - | 0,75 | 16,59 | $C_3S_1$ | <0,67 |
| **11** | 7,99 | 910 | 1,20 | 0,12 | 4,21 | 3,82 | 9,35 | 0,00 | 0,75 | 3,94 | 4,76 | 9,45 | - | 0,60 | 12,83 | $C_3S_1$ | <0,67 |
| **12** | 8,02 | 1010 | 1,35 | 0,41 | 5,62 | 3,02 | 10,40 | 0,00 | 1,35 | 4,22 | 5,08 | 10,65 | - | 0,65 | 12,98 | $C_3S_1$ | <0,67 |
| **13** | 8,12 | 870 | 1,00 | 0,23 | 4,63 | 2,99 | 8,85 | 0,00 | 1,12 | 2,98 | 4,55 | 8,65 | - | 0,51 | 11,30 | $C_3S_1$ | <0,67 |
| **14** | 7,65 | 1120 | 1,45 | 0,30 | 6,59 | 3,21 | 11,55 | 0,00 | 1,95 | 4,89 | 4,86 | 11,70 | - | 0,66 | 12,55 | $C_3S_1$ | <0,67 |
| **15** | 7,48 | 1150 | 1,65 | 0,42 | 6,99 | 2,74 | 11,80 | 0,00 | 1,52 | 5,09 | 5,34 | 11,95 | - | 0,75 | 13,98 | $C_3S_1$ | <0,67 |
| **16** | 7,91 | 1130 | 1,74 | 0,65 | 6,52 | 2,74 | 11,65 | 0,00 | 1,48 | 5,51 | 4,51 | 11,50 | - | 0,81 | 14,93 | $C_3S_1$ | <0,67 |
| **17** | 7,55 | 1110 | 2,34 | 0,41 | 6,23 | 2,52 | 11,50 | 0,00 | 1,33 | 3,56 | 6,71 | 11,60 | - | 1,12 | 20,35 | $C_3S_1$ | <0,67 |
| **18** | 7,49 | 1075 | 2,42 | 0,36 | 4,84 | 3,38 | 11,00 | 0,00 | 1,30 | 3,25 | 6,35 | 10,90 | - | 1,19 | 22,00 | $C_3S_1$ | <0,67 |
| **19** | 7,91 | 1025 | 2,00 | 0,18 | 4,78 | 3,59 | 10,55 | 0,00 | 1,05 | 3,80 | 5,75 | 10,60 | - | 0,98 | 18,96 | $C_3S_1$ | <0,67 |
| **20** | 7,90 | 1000 | 1,78 | 0,32 | 4,62 | 3,48 | 10,20 | 0,00 | 1,00 | 3,26 | 5,84 | 10,10 | - | 0,89 | 17,45 | $C_3S_1$ | <0,67 |

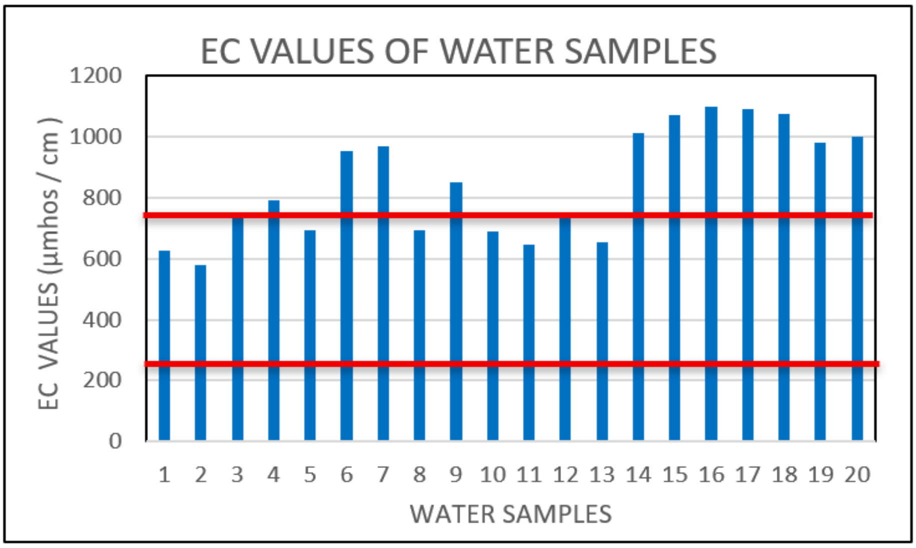


**FIGURE 2: EC values of irrigation water samples taken in June**

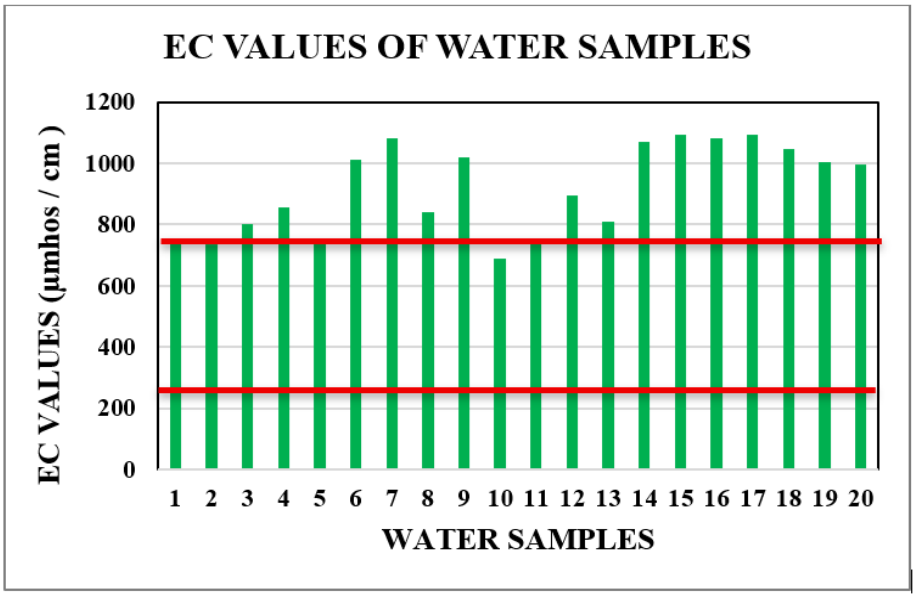


**FIGURE 3: EC values of irrigation water samples taken in July**

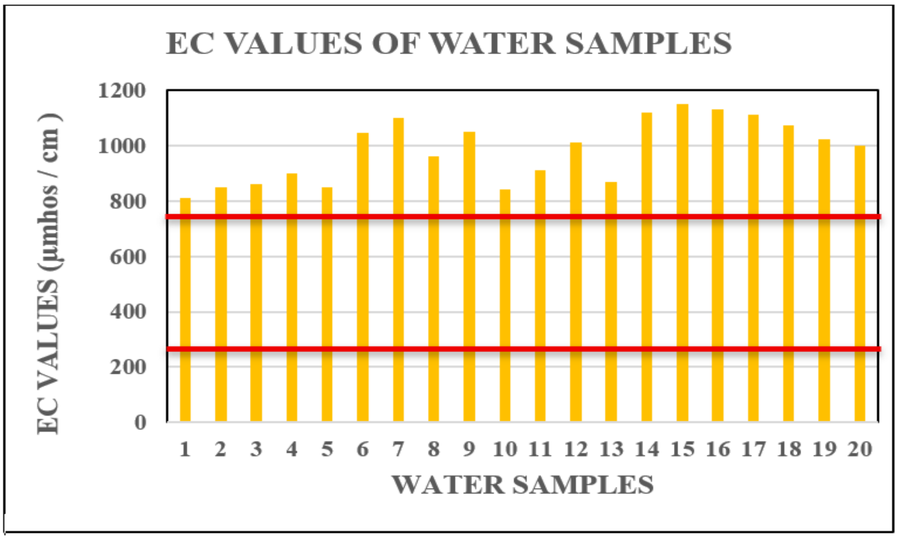


**FIGURE 4: EC values of irrigation water samples taken in August**

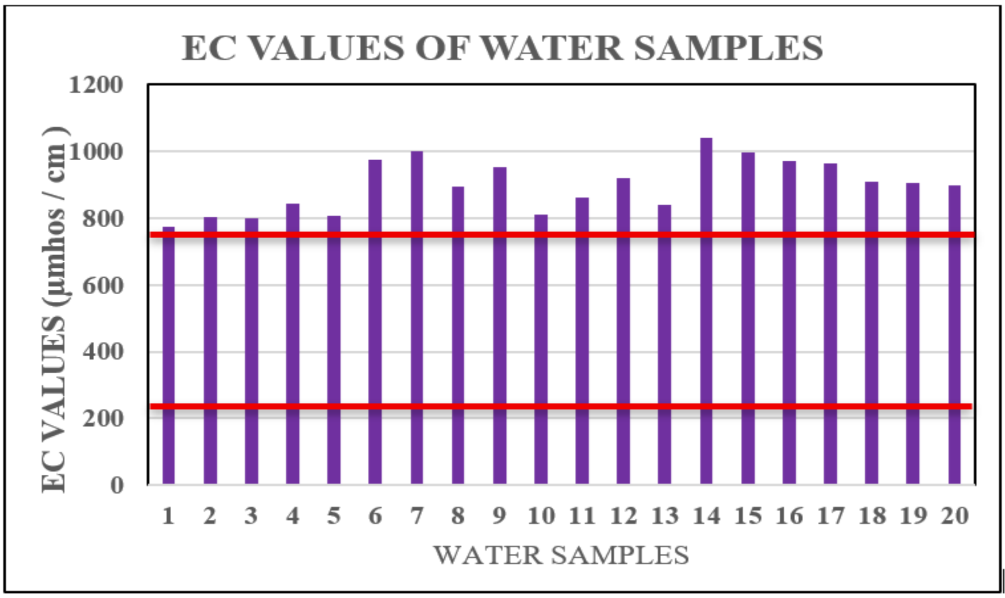


**FIGURE 5: EC values of irrigation water samples taken in September**

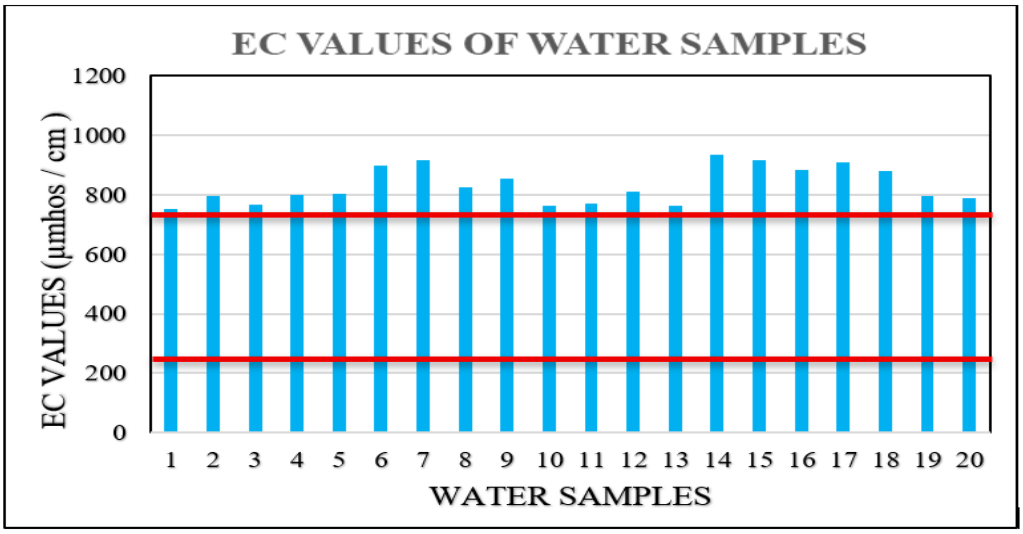


**FIGURE 6: EC values of irrigation water samples taken in October**

## IV. CONCLUSION AND RECOMMENDATIONS

The results obtained from this study, which was conducted to determine the irrigation water quality of water resources (wells) used in some agricultural lands in Konya-Çumra-Alemdar Neighborhood, are summarized below:

### 4.1 Conclusion:

1) The EC values of water samples taken from irrigation water resources were generally above 750 µmhos/cm. In agricultural lands irrigated with irrigation water ($C_3$) samples exceeding the threshold water salinity, salt-tolerant plants may need to be preferred, and special measures may be required to control salinity. In the study, EC values were found to range between 580 and 1150 µmhos/cm, while pH values ranged between 7.11 and 8.12. Irrigation water salinity classes were identified as $C_2S_1$ (moderately saline - low alkaline) and $C_3S_1$ (highly saline - low alkaline).

2) In terms of water-soluble anions and cations, irrigation water samples were rich in Ca cation and $SO_4$ anion. Sodium adsorption ratios (SAR) ranged from 0.51 to 1.29. Sodium percentages ranged from 10.22 to 23.91, and boron concentrations in all samples were found to be below the threshold boron level of 0.7 ppm.

3) The salinity levels of irrigation water in the study area were generally found to be high. Such a case may cause salinity problems in agricultural areas where these waters are used.

### 4.2 Recommendations:

1) To prevent salinity problems, drainage systems should be developed, and periodic maintenance should be performed on existing drainage networks.

2) Soils should be enriched with organic matter, and soil cultivation techniques should be prioritized.

3) Due to climate change in recent years, rainfall has decreased and there is a greater need for irrigation water, so it is likely that salinity and alkalinity problems will be encountered in the coming years. Therefore, leaching and reclamation efforts should be prioritized now.

4) To avoid yield losses in agricultural production, the irrigation water required by the plant must be provided using appropriate methods. Considering the limited availability of water, sprinkler and drip irrigation methods should be preferred in the region. The number of irrigations and the amount of water provided should be planned to avoid unnecessary and excessive irrigation.

5) Farmers should be made aware of soil, plant, and irrigation water quality issues through relevant educational institutions or with the assistance of relevant units in agricultural organizations.

6) In the irrigated lands where salinity, alkalinity, and boron problems are observed or may occur, the supply of high-quality irrigation water is of great importance. Therefore, further development of projects such as the KOP project will be beneficial.

## REFERENCES

[1] Taş, İ., Yıldırım, Y. E., Özkay, F. & Aras, İ., 2013. Konya Ovasında Su Kalitesi ve Toprak Tuzluluğu. *Ulusal Kop Bölgesel Kalkınma Sempozyumu*, 14–16 Kasım 2013, Konya. (In Turkish)

[2] Alpaslan, K., Karakaya, G., Gündüz, F. & Koçer, M. A. T., 2016. Boztepe Recai Kutan Baraj Gölü Su Kalitesinin Değerlendirilmesi. *Türk Tarım ve Doğa Bilimleri Dergisi*, 4(1): 22–29. (In Turkish)

[3] Kaçar, K. & Tüfenkçi, Ş., 2021. Hakkari Bölgesindeki Bazı Sulama Havuzlarının Sulama Suyu Kalitesi Açısından Değerlendirilmesi. *Yüzüncü Yıl Üniversitesi Tarım Bilimleri Dergisi*, 31(1). (In Turkish)

[4] Patlar, E. B. & Yılmaz, A. M., 2025. Quality Assessments for Irrigation Waters used in Agricultural Fields of Konya - Meram Hatunsaray Neighborhood. *International Journal of Environmental & Agriculture Research (IJOEAR)*, 11(7): 45–55. ISSN: 2454-1850.

[5] Topçu, E. & Taş, İ., 2020. Sulama Suyu Kalitesi Açısından Çanakkale–Biga Ovası Yeraltı Sularının Durumu. *ÇOMÜ Ziraat Fakültesi Dergisi (COMU J. Agric. Fac.)*, 8(1): 251–260. ISSN: 2147–8384 / e-ISSN: 2564–6826. doi:10.33202/comuagri.732685. Çanakkale. (In Turkish)

[6] Demer, S. & Hepdeniz, K., 2018. Isparta Ovasında (GB-Türkiye) Sulama Suyu Kalitesinin İstatistik ve Coğrafi Bilgi Sistemleri Kullanılarak Değerlendirilmesi. *Türk Coğrafya Dergisi*, 70: 109–122. (In Turkish)

[7] Avcı, O. & Yılmaz, A. M., 2025. Quality Assessment of Irrigation Waters used in Agricultural Fields of Mersin Mezitli District and Irrigation-Induced Soil Salinity Assessments. *International Journal of Environmental & Agriculture Research (IJOEAR)*, 11(7): 81–92. ISSN: 2454-1850.

[8] Dorak, S. & Çelik, H., 2017. Irrigation Water Quality of Nilüfer Stream: Effects of the Wastewater Discharges of the Treatment Plants. *Ege Üniversitesi Ziraat Fakültesi Dergisi*, 54(3): 249–257.

[9] Akaroğlu, Ş. N. & Seferoğlu, S., 2018. Sulama Suyu Kalitesinin Çileğin (Fragaria x ananassa Duch. Rubygem) Besin Maddesi İçerikleri ve Bazı Meyve Kalite Özellikleri Üzerine Etkileri. *ADÜ Ziraat Dergisi*, 15(1): 47–54. Aydın. (In Turkish)

[10] Aregahegn, Z. & Zerihun, M., 2021. Study on Irrigation Water Quality in the Rift Valley.

[11] Ilan, S., Thevs, N. & Priori, S., 2021. Soil Salinity and Sodicity in Drylands: A Review of Causes, Effects, Monitoring, and Restoration Measures. *Frontiers in Environmental Science*, 9: 712831. doi:10.3389/fenvs.2021.712831.

[12] Anonymous, 2022(a). Konya. *Vikipedi*. Available at: https://tr.wikipedia.org/wiki/Konya (In Turkish).

[13] Anonymous, 2017. Konya İl Jandarma Komutanlığı Coğrafi Bilgiler. Available at: http://www.konya.gov.tr/il-jandarma-komutanligi-cografi (In Turkish).

[14] Bostancı, İ., 2023. Konya Kapalı Havzası Sulama Birliklerinin Sulama Yönetimindeki Etkileri ve İşletme Sorunları. Doktora Tezi, Selçuk Üniversitesi Fen Bilimleri Enstitüsü, Konya. (In Turkish).

[15] Anonymous, 2020. Peyzaj Alanlarının Drenajı. Available at: http://sulamatr.com/peyzaj-alanlarinin-drenaji/ (In Turkish).

[16] Anonymous, 2022(b). Çumra İlçe Milli Eğitim Müdürlüğü. Available at: https://cumra.meb.gov.tr/ (In Turkish).