



Salt affected soils in Türkiye

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Introduction

As an agricultural country, Türkiye has salinity problems in 1.7% (1,518,746 ha) and 3.8% (837,405 ha) of its agricultural land. In Figure 1, yellow color shows calcisols in Türkiye. Barren lands correspond to 2% of the country's surface area and 5.48% of total cultivated lands. In total, 74% of barren lands are saline, 25.5% are saline-alkaline and 0.5% are alkaline soils (Anonymous, 2022). Figure 2 shows common primary and secondary sources of soil salinization. In this study, salinization in two important agricultural areas in Türkiye, Konya Basin and Iğdir Plain, is described.

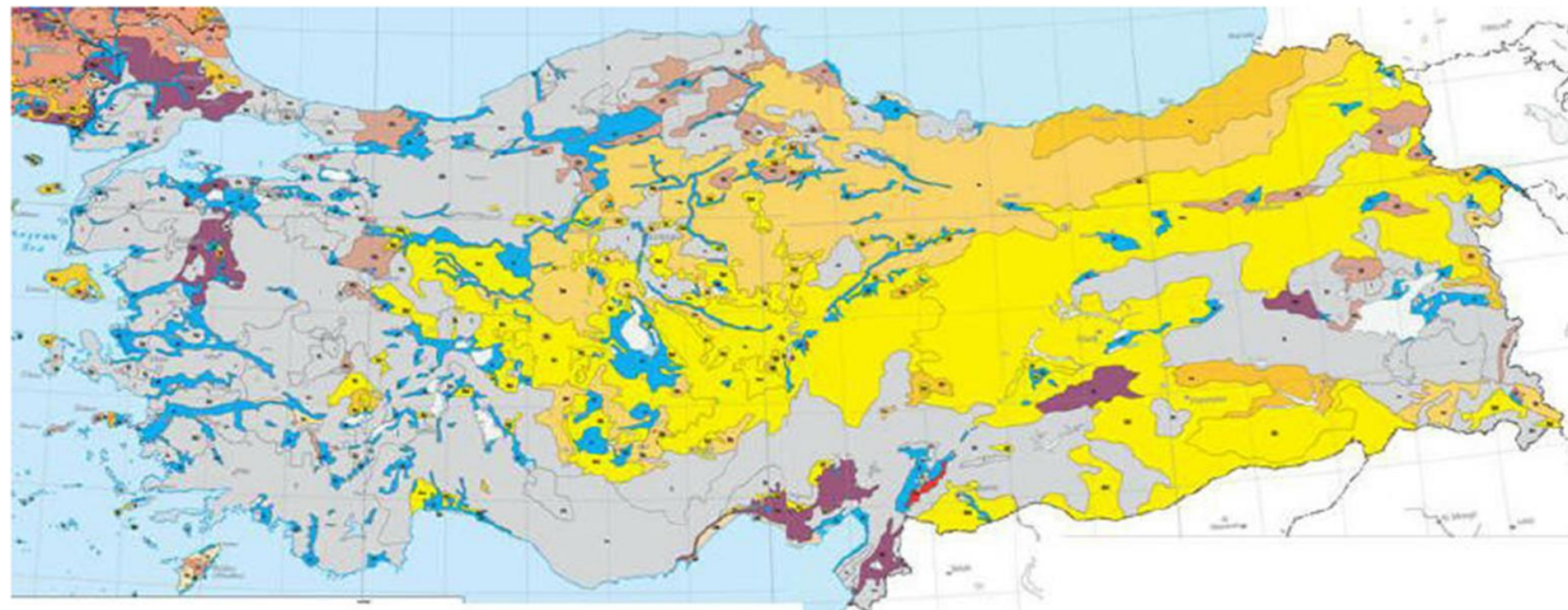


Figure 1: Map of the principal soil types in Türkiye (European Commission and European Soil Bureau Network, 2006); calcisols (yellow), cambisols (orange) and leptosols (grey), and fluvisols (blue)

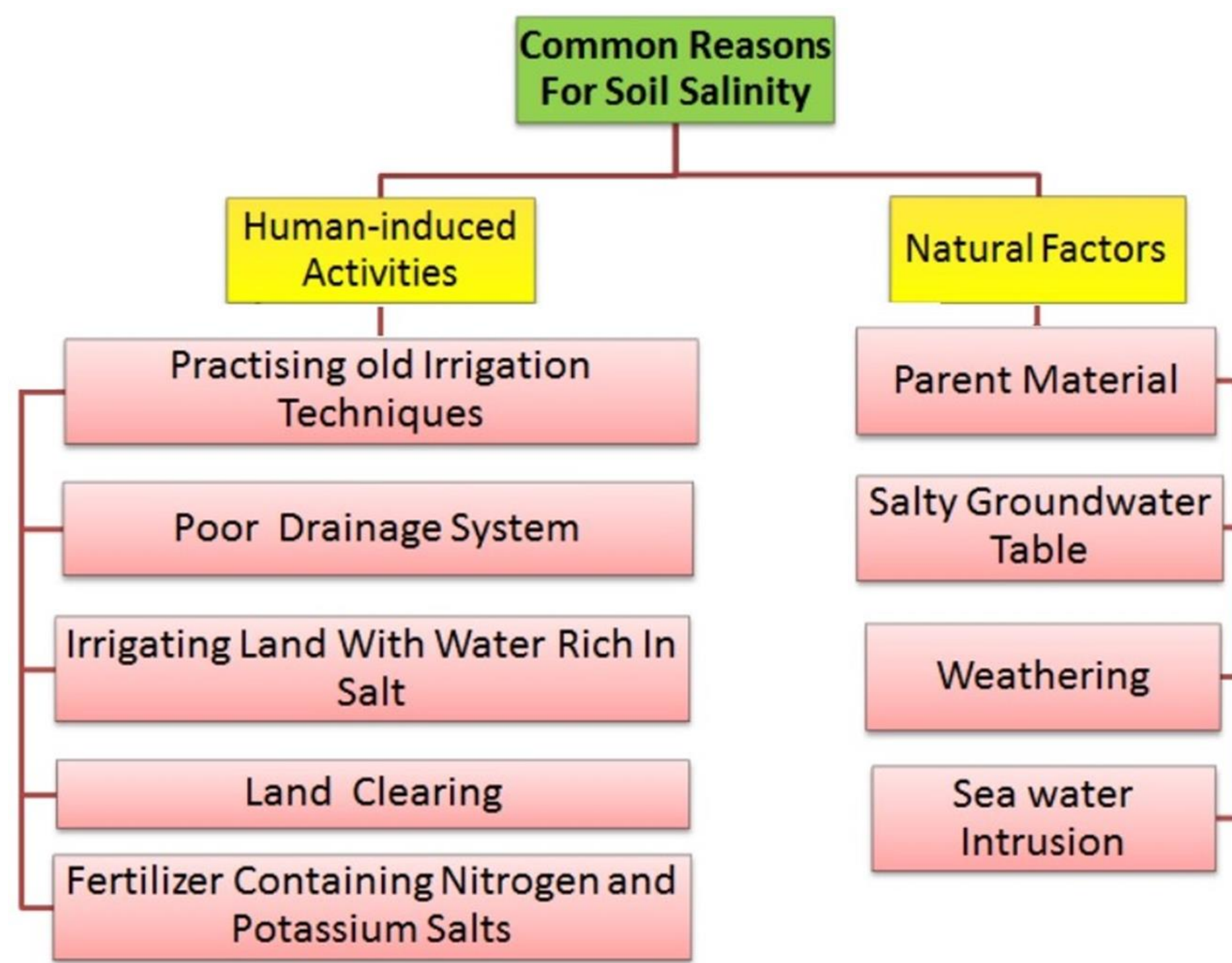


Figure 2: Common primary and secondary sources of soil salinization (Gorji, 2016)

Soil salinity in Konya Basin

The largest area affected by salt in Türkiye is located in the Konya Basin. A significant part of the soils in this basin are soils formed under the influence of saline groundwater. In this basin, where there are lakeshores and temporary puddles, sodium chloride and sodium sulphate as well as calcium and magnesium salts accumulate on the soil surface and form saline soils (solonchaks). The degree of salt deposition is very intense, with white salt crust covering many areas. Even in cases where the groundwater level is not connected to the surface, saline soils have developed due to localized salt accumulation caused by the arid climate.

Sometimes, salinity did not occur at the surface but in the near-surface parts of the profile. In this basin saline soils have formed in association with marshes and in some cases gypsiferous soils as a result of gypsum deposition (Anonymous, 2024). In general, the basin is a catchment area and salts are transported into the basin by rivers, seepage and surface runoff. Besides water, wind also plays an important role in this transportation. Compared to saline soils, there are very few alkaline soils in the Konya Basin. Alkalinity is found practically in the low-lying central part of the basin, together with salinity. In alluvial soils affected by river waters, alkalinity is found in various degrees. All salt affected soils of Konya basin contain chlorides and sulfates. Their ratios vary according to their location. In the eastern part of the basin where marine sediments are found, chlorides and locally sulfates are dominant. Although more sulfates come from the mountains in the west, chlorides were found in high amounts especially in Vertisols with a ground water level below 1.80 m (Anonymous, 2024). Figure 3 and Figure 4 show different salt affected areas in Konya Basin.



Figure 3: Salt lake in Türkiye (Gorji, 2016)



Figure 4: Saline area plant formation in Konya, Türkiye (Armagan and Isik, 2022)

Soil salinity in Iğdir Plain

Another region in Türkiye with salt affected soils is the Iğdir Plain. 36476 ha of the 92200 ha Iğdir Plain, which is suitable for intensive agriculture with its climatic characteristics, is saline, alkaline, saline-alkaline and boron lands. When roads, canals, settlements and reed areas are included, 41701 ha of the surface area of the plain is non-agricultural. In other words, more than one third of the agricultural land in the Iğdir plain has lost its productivity due to the salt effect. The availability of land used in agriculture is limited and the main problems are inefficiency, stoniness, high slope, salinity, overgrazing in pastures, water and wind erosion, misuse, short growing period due to cold and continental climate. In Iğdir plain soils, pH >8, ESP >15% and SOM content varies between 0.36-1.71% (Karaoglu and Yalcin, 2018). In addition to these two areas, salinization problems have started especially in the soils of the Southeastern Anatolia Region where irrigated agriculture has been introduced and in the plains of the Mediterranean, Aegean and Marmara Regions where intensive agricultural activities are carried out. These areas are of vital importance for Turkish agriculture due to their production capacity. In addition, seawater intrusion is also an issue that needs to be considered when researching salinization of coastal plains.



Figure 5: Soil salinity in Iğdir Plain (Karaoglu and Yalcin, 2018)

References

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