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WP5: Policy framework for the salinisation management,

D5.1 A policy brief related to sustainable saline agriculture value chain to support national and international agricultural policies (M12-30)

TURKİYE

The Status and Institutional Management of Salt-Affected Soils of Türkiye

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Soil salinization occurs in hot and semi-arid climates where high groundwater tables are present. In cases where groundwater remains near the soil surface, evaporation transports salts to different soil depths, gradually increasing salt concentration. When this concentration surpasses plant tolerance levels, it can lead to yield losses. In Türkiye, where a large portion of the country is subject to hot and semi-arid climates, soil salinity varies in severity due to topographic features and agricultural irrigation practices. In areas affected by salinity in Türkiye, a significant portion of the land is still used for agriculture. In regions with higher salinity, such as Central Anatolia, the Mediterranean, and Southeastern Anatolia, salt-tolerant crops like barley, sugar beet, cotton, and wheat are cultivated on slightly to moderately saline soils. However, in some cases, temporal changes in salinity levels may exceed plant tolerance limits, resulting in yield losses.

Soil salinity can vary over time depending on groundwater presence and evaporation conditions. To manage this, salinity maps should be updated at least every five years, enabling informed production planning. Since the last salinity map update for Türkiye was conducted 20 years ago, there is currently no up-to-date information on the spatial distribution of current salinity severity across the country.

Currently, no specific unit in Türkiye is dedicated solely to creating salinity maps. However, the General Directorate of Agricultural Reform within the Ministry of Agriculture and Forestry, as well as the Soil, Fertilizer, and Water Resources Research Institute, address issues related to soil salinization. Aside from topographically unmanageable areas, national salinity severity maps could be developed using updated groundwater and salinity maps. Remote Sensing (RS) and Geographic Information System (GIS) techniques offer significant advantages in the creation and updating of salinity maps.

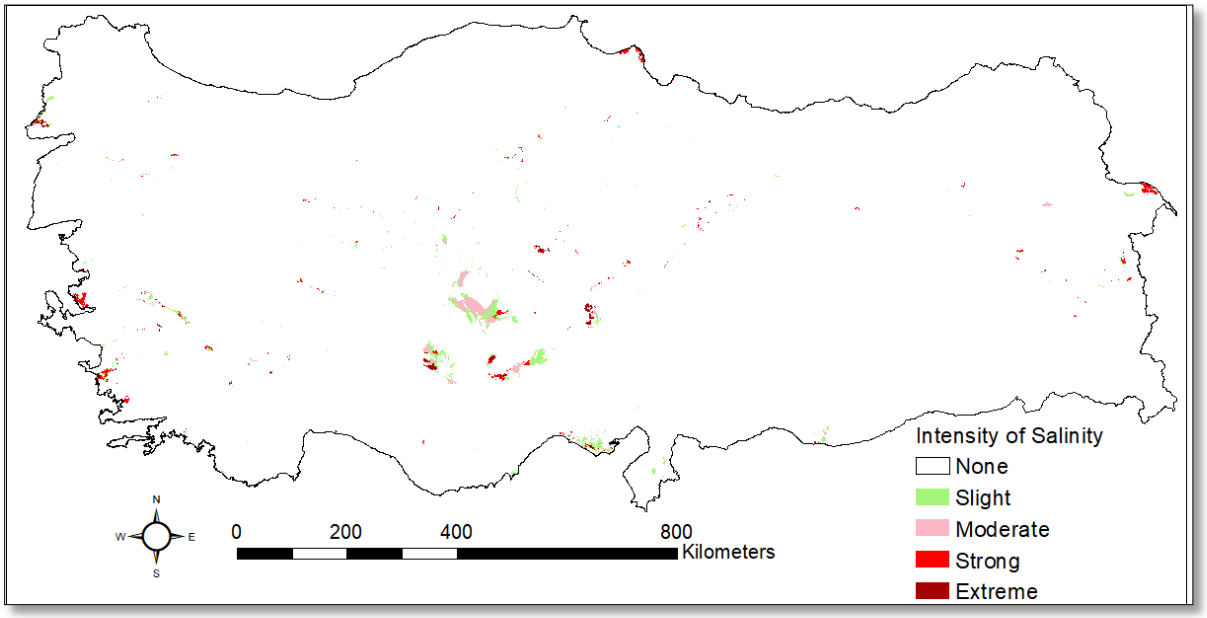
In hot and semi-arid climates, salt can accumulate in the root zone at levels that exceed plant tolerance without the farmer realizing it, especially in the presence of groundwater, leading to yield losses. Providing farmers in salinization-prone areas with information on proper irrigation techniques, fertilization, and crop selection can help prevent such losses.

In Türkiye, around 25% of salt-affected soils are classified as Saline-Alkaline, with alkaline soils located solely in Central Anatolia, covering a very limited area. Proper mapping of slightly, moderately, and severely saline soils, which are crucial for agriculture, and offering reclamation and crop pattern recommendations based on salinity severity, are essential.

Informational and awareness-raising meetings with government agencies, civil society, and farmers will play a key role in guiding salinity management and crop pattern decisions.

Spatial Distribution and Changes of Salt-Affected Soils in Türkiye

According to the criteria used in the Enhanced Soil Map studies conducted between 1966 and 1971, by the General Directorate of Soil and Water, Türkiye has 1,518,722 hectares affected by salinity and sodicity. Of this area, 41% is classified as slightly saline, 33% saline, 0.5% sodic, 8% slightly saline-sodic, and 17.5% saline-sodic. Salt-affected soils account for 2% of Türkiye's total land area and 5.48% of cultivated agricultural land. Mapping results indicate that 74% of the total salt-affected areas are saline, 25.5% saline-sodic, and 0.5% alkaline (sodic) soils (Sönmez, 2011). In a revision study, samples were re-taken from salt-affected areas in soil maps prepared by the General Directorate of Rural Services from 1966 to 1971. This reassessment in the 2000s revealed that 163,638 hectares of dry farming areas, 449,709 hectares of irrigated agricultural land, 9,050 hectares of vineyards and orchards, 733,422 hectares of pasture areas, and 11,436 hectares of forest and shrub areas in Türkiye are affected by salinity. In total, 1,367,255 hectares are affected by salinity (Sönmez, 2004).



Map. The Salt-Affected Lands of Türkiye

In the salinity mapping revision studies conducted for Türkiye, 74% of salt-affected lands were classified as Saline Soils (slight, moderate, high), while 26% were categorized as Saline-Sodic and Sodic soils. This indicates that, upon completion of updated maps of salt-affected areas, large-scale economic benefits could be achieved by developing an appropriate crop pattern for these areas.

The first soil map of Türkiye at a 1:100,000 scale was prepared by the General Directorate of Soil and Water between 1966 and 1971. It was updated between 1982 and 1984 by the General Directorate of Rural Services and later digitized with additional updates in the late 2000s. Through GIS database analysis of soil maps created by the General Directorate, Soil and Water between 1966 and 1971, areas affected by varying degrees of soil salinity have been mapped (Map).

The issue of soil salinization, which negatively impacts agricultural productivity in Türkiye, is widespread in key agricultural areas such as Konya-Ereğli, Aksaray, Malya, Erzurum, Erzincan, Çukurova (Dinç et al., 1990), Iğdır, Menemen, Bafra, Söke, Acıpayam, Salihli (Bayramin et al., 2004; Sönmez, 2011), Harran (Çullu et al., 2010), Amik (Kılıç et al., 2008), and Reyhanlı (Atasoy and Çeçen, 2014). However, much of the research on salt-affected lands and distribution in these regions is now outdated. Only in highly agricultural

areas, such as the Çukurova, Harran, and Söke plains, are there recent mapping studies conducted by universities and research institutions (Çullu et al., 2010; Dinç et al., 1990; Atatanır et al., 2010).

The creation of updated and detailed maps of areas affected by various degrees of salinity in Türkiye will be crucial for soil reclamation and crop pattern planning. This will guide the development of sustainable agricultural practices that enhance the country's agricultural productivity and support the successful implementation of long-term agricultural strategies.

Evaluation

In Türkiye, effectively monitoring and managing the salinization problems caused by high groundwater levels, which result from climatic and topographic conditions as well as excessive irrigation practices, is of paramount importance. Regular mapping of critical parameters such as groundwater levels and salinization is a strategic necessity for sustainable agricultural production and natural resource management.

The maps showing groundwater levels and salt content, prepared by the General Directorate of State Hydraulic Works (DSİ) under the Ministry of Agriculture and Forestry, can be updated through field studies by integrating them with soil salinity maps developed by institutions such as the Soil and Fertilizer Research Institute within the General Directorate of Agricultural Research and Policies (TAGEM) or the units under the General Directorate of Agricultural Reform.

In conclusion, updating maps of areas affected by various degrees of salinity across Türkiye will be crucial for soil reclamation and crop pattern selection. Educational and awareness-raising initiatives in this regard will support institutionalization, contribute to reducing agricultural yield losses, and facilitate the continuous monitoring of salinity in the country.

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