# Salt-affected soils in Bulgaria

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## INTRODUCTION

Salt affected soils cover about 55 000 ha of the Bulgarian territory, 35 500 ha of which have been salted by natural processes and 25 000 ha by industrial and drainage activities before year 1990.This was the period with high industrialisation, irrigation and intensive agriculture (Teoharov et al. 2016). Salt affected soils in Bulgaria could be found in places such as, Danube river plain - the lowlands along the Danube river (Karaboazka, Svishtov-Belenska, Brashlenska, Tsibarska, etc.) and near some tributaries - Skat, Osam, Vit, Yantra, Studena, etc. In the Upper Thracian Plain - around Plovdiv region, the Tundzha plain - in the regions of Yambol, Nova Zagora, Kermen, Radnevo, Karnobat, Straldzha (former Straldzha marsh), the Southern Black Sea coast - near the Burgas lakes - Vaya, Mandra and Atanasovsko lake. There are also some small spots of in western Bulgaria, close to the rivers. (Teoharov et al., 2019).

Nowadays the area of salt affected soils is slowly decreasing, due to using different chemical amendments, lack of irrigation and better industrial technologies or closed industrial pollutants.

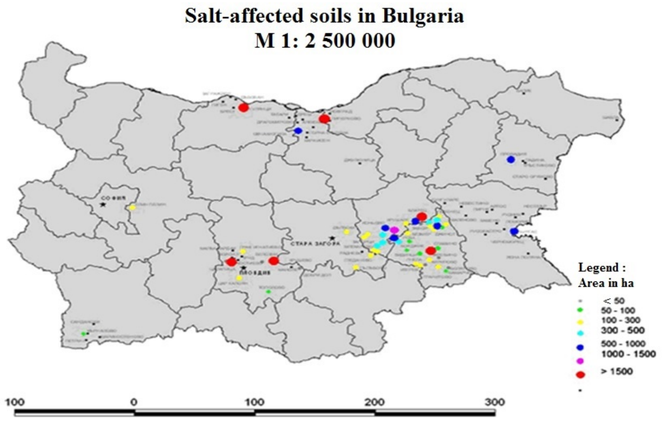


**Fig 1.** Salt affected soils in Bulgaria - Source ExEA http://eea.government.bg/eea/bg/publicat/2004-3/quality/soil/soil4.htm

## METHODOLOGY

The monitoring of the soil salinization process is carried out in selected areas defined by the Bulgarian Executive Environment Agency (ExEA). Eight soil indicators are measured (water-soluble $Na^+$, $Cl^-$, $SO4^{2-}$, $HCO3^-$ and $CO3^2$, exchangeable $Na^+$, and CEC) and groundwater properties. The spots are representative of saline soils. The research on salt affected soil in Bulgaria also are carried out by soil scientists form scientific institutes and universities.

## RESULTS

The process of natural soil salinization its development is associated primarily with high groundwater table with conditions for natural drainage, with periodic summer droughts in most of the plains in Bulgaria, with the characteristics of local relief and some other natural factors. Soil salinization is a process in which the content of water-soluble salts and / or exchanged sodium in soils increases in quantities that negatively affect their properties, respectively their productive potential.

Usually in Bulgaria the salinization is low, but the soil dries out significantly in the summer period and salts are observed. In other places, spring rains brings shallow layer of water, but in summer the high groundwater carries up a lot of dissolved salts, which "bloom" on the surface.

According to ExEA, in Bulgaria, about 35 500 ha of arable land are affected by the salinization processes, This is under 0.5 % of territory of the state. About 252 ha of the area have soidc salinization. The processes mainly affect the districts of Burgas, Varna, Veliko Tarnovo, Pleven, Plovdiv, Sliven, Stara Zagora and Yambol (ExEA, 2018).

The type and degree of salinization of the soil is due to differences in the nature of salinization. The accepted classification divides into two classes of Solonchaks and Solonetz.

In some salt afected areas high content of water-soluble salts, the Solonetz evolved as Solonchaks-Solonets. These are the most common cases in Bulgaria. During the wet periods the salts are washed and soils have the properties of Solonetz. During the dry seasons capillary salt water rise and soils have the property of Solonchaks (Teoharov et al., 2019).

**Fig 2.** Solonchak – Solonetz soils in vilage of Belozem – dis. Plovdiv, Bulgaria

## DISCUSSION

In last decade, the trends are maintained, in some of the areas there is a decrease in the content of exchanged sodium and a decrease in the soil reaction (pH). The salinization processes is determined by climate change, irrigation and intensive agriculture. Most of the salt affected soils are mainly abandoned agricultural areas or wet areas with low fertility. Their inclusion in the arable fund of the country is possible after correction of the existing drainage systems and implementation of chemical amendments, in accordance with the specific conditions of each site.

By 1990 in Bulgaria were irrigated about 1,2 million ha of agricultural land, in 2012 the area is only 541800 ha and sometimes much lower (Patamanska, 2012). A limited area with irrigation decreases the process of salinization.

According to ExEA (2018) the salinization have high degrees in Plovdiv region and Varna region . The last one is influenced by the process of secondary salinization of industrial type. The soils are located mainly around the salt mine along the Provadia-Devnya salt pipeline and in the lower part of the Provadiyska River to its delta.

## CONCLUSIONS

The degree of salinization processes in Bulgaria is determined by different natural and anthropological factors such as precipitation, vegetation, land use, irrigation, drainage system, industrial pollution, etc. Conducted soil researches and soil monitoring in our state show improvement of soil quality. In some observed spots there are decrease in the content of exchangeable sodium and a decrease in the soil reaction also. Limited irrigation in last decades also decreased the salinity levels. In some areas implementation of chemical amendments were also used to decrease high consecrations of exchangeable sodium. Nevertheless in low relief forms salinization arising from rise of water table in soils with high the presence of sodium substances. In present days there are also preserved salt affected areas, because of protected halophyte species and wet zones.

## REFERENCES

1.Executive Environment Agency (ExEA), 2018, Soil Salinization report. [online]. http://www.eea.government.bg/bg/soer/2018/land-use/sastoyanie-na-pochvite

2.Patamanska G., 2012. Changing existing irrigation systems and management in Bulgaria for sustainable use of water, Water Management, 5-6, 29-35.

3.Teoharov, M., Hristov, B. 2017. Soil, Earth and People - Our Care and Responsibility. Bulgarian Journal of Soil Science, 2(2), 89–98. https://doi.org/10.5281/zenodo.2585674

4.Teoharov M. ed. 2019. Genetic and applied classifications of soils and lands in Bulgaria. BSSS pub. 214 p. ISBN 978-619-90414-3-7.

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