

## WATER QUALITY OF IRRIGATION WELLS IN EASTERN TESSALONIKI REGION

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### EXTENDED ABSTRACT

In the years 1999-2001 the Soil Science Institute has collected and analyzed 386 water samples coming from a respective number of high depth irrigation wells, for pH electric conductivity and content in various ions and chemical elements. The purpose of these samplings was to assess the suitability of these waters for irrigation. The areas from which samples were taken were the municipalities of Langada, Koroneia, Appolonia, Madytos, Rentina, Agios Georgios, Arethousa and Sohos. Laboratory analyses gave the followings results:

The water samples had a slightly alkaline pH, ranging from 6,5 to 8,4 and very good (low to slightly increased) electric conductivity, ranging from 0 to 3 mmhos/cm. Their content in  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{Na}^{2+}$  was very low, while in  $\text{K}^{+}$  it was in many cases higher than normal for irrigation waters. The content in  $\text{CO}_3^{2-}$ ,  $\text{HCO}_3^{-}$ ,  $\text{Cl}^{-}$ ,  $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$  was within accepted limits for all examined waters. In 29 from the 386 samples the concentration of  $\text{NO}_3\text{-N}$  was found slightly higher than 10 mg/L, which is regarded as the highest acceptable limit for irrigation waters. In contrast, the concentration of  $\text{NH}_4\text{-N}$  never exceeded the respective highest acceptable limit of 5 mg/L. Also  $\text{NO}_2\text{-N}$  was detected in 192 from the 386 water samples, but in very low concentrations (below 0,2 mg/L).

Measurements of trace elements and heavy metals have shown that: a) the concentrations of Zn, Cu, Cr, Ni and Pb are below the maximum acceptable limit reported in the literature, which are 2.0, 0.2, 0.1, 0.2 and 5.0 respectively, b) Fe exceeded the highest acceptable concentration limit of 5,0 mg/L only in 2 samples, c) higher Mn concentrations from the accepted upper limit of 0,2 mg/L were found in 41 from the 386 samples, d) the concentrations of Cd and Co were below detection limits (0,028 and 0,12 mg/L respectively) of the atomic absorption apparatus used. Maximum accepted concentration limits in irrigation waters are 0,01 mg/L for Cd and 0,05 mg/L for Co.

In the case of Boron, 377 from the 386 samples contain 0 to 0,5 ppm and thus are classified as category I. The remaining 9 water samples belong to category II. As regards their salinity hazard 316 water samples fall into category I, 51 to categories I and II, and 19 to various categories, and particularly category III, depending on soil permeability (porosity). Concerning alkalinity hazard 92 waters belong to category I, 266 to categories I and II and 28 mainly to category III. It has to be clarified that category I waters covers waters generally suitable for irrigation, without any problem for either crops or soils. Category II are under certain circumstances and conditions suitable for irrigation, while category III waters are totally unsuitable for irrigation.

The overall conclusion from the above research is that most of these waters -with the exception of 19 out of 386 samples- are suitable for irrigation.

**Key words:** quality irrigation waters, chemical analyses of waters, salinity hazard, alkalinity hazard.