

Irrigation Influence on Soybean Metal Content in Transylvania's Conditions

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Abstract. This paper presents some results of the researches regarding the influence of irrigation conditions, fertilization and biological material, on the soybean metal content, in the conditions of Transylvania (Viișoara-Turda), the average of the years 2009-2011. Quality analysis were performed at the Institute for Research and Analytical Instrumentation (ICIA) Cluj-Napoca. Irrigation and fertilization applied on the soybean culture greatly influenced the content of metals in grains, during the period of research.

Keywords: irrigation, fertilization, genotypes, soybean, quality, heavy metals

Introduction. In Romania soybean crop was introduced to the late nineteenth century, being reported since 1876, in some gardens as an ornamental plant (in Transylvania). Given the growing culture in the Transylvanian plain, here are cultivated with priority soybean varieties developed at the Station for Research and Development Turda (Giosan, *et al.*, 1986; Mureșanu, 2003; Luca, 2012).

Materials and methods. The experimental factors were: factor A - Irrigation regime, with two graduations - a_1 - non-irrigated and a_2 – irrigated at 50 % IUA; factor B - fertilisation with three graduations – b_1 - basic fertilization, b_2 - basic fertilization + additional fertilization and b_3 - organic fertilization; factor C – variety with three graduations, the varieties Onix, Eugen and Felix, created at Station for Research and Development Turda. Soybean crop technology was applied as recommended by the research team of the Station for Research and Development Turda. For basic fertilization were administered every year 60 kg/ha N, 30 kg / ha P_2O_5 and 30 kg / ha K_2O and the additional fertilization was done on the seeds with Nitragin to stimulate the formation of the nitrogen fixing nodules on the roots. Organic fertilization was achieved by applying 40 tons of manure on the prior corn crop in a rotation ready for environmental certification of three cultures, namely wheat, corn and soybeans.

Results and Discussion. The content of Iron (Fe) and Copper (Cu) in soybeans, the average of the years 2009-2011, obtained in the conditions of Viișoara – Turda is presented in Fig. 1 and Fig. 2. In particular, the heavy metal content of the grains is due to existing metal content in the soil. Soil from Viișoara - Turda is a soil that presents historic pollution due to the proximity to the town of Turda, one of the "critical spots" regarding the environmental quality of the Transylvanian Plain. Analyzing the obtained results, can be made the following findings on the iron content of the three varieties tested: *Variety Onix*. Determined iron content has lower values than the other two cultivars studied. In terms of non-irrigation, but applying an organic fertilizer, it is registered a content of 68.75 mg/ kg and applying irrigation and the same type of fertilization results an increased iron content up to 69.03 mg/kg. *Variety Eugen*. The highest iron content was obtained from version $a_2 \times b_3 \times c_2$ – 81,45 mg/kg. *Variety Felix*. Variety Felix presented a development close to the variety Onix. The highest content in this variety was developed variant $a_2 \times b_3 \times c_3$ - 69,25 mg/kg. The results achieved

on the copper content of soybeans makes possible the following appreciations: *Variety Onix*. Application of irrigation and organic fertilizer during the growing season increase the content of Cu up to 13.15 mg/ kg (variant $a_2 \times b_3 \times c_1$). *Variety Eugen*. By applying irrigation and fertilization the content of the metal increases, so that in the variant $a_2 \times b_3 \times c_2$ it reaches a value of 13.25 mg/ kg. *Variety Felix*. The highest values were obtained for the experimental variant $a_2 \times b_3 \times c_3$, ie 13,3 mg/ kg.

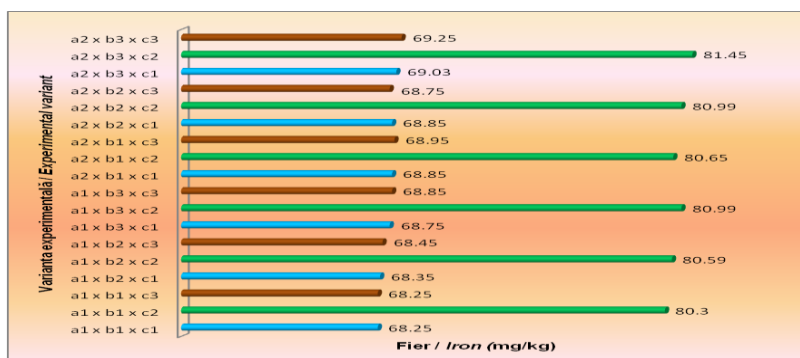


Fig. 1. Content of Iron (Fe) in soybeans, the average of the years 2009-2011, obtained in the conditions of Viișoara – Turda

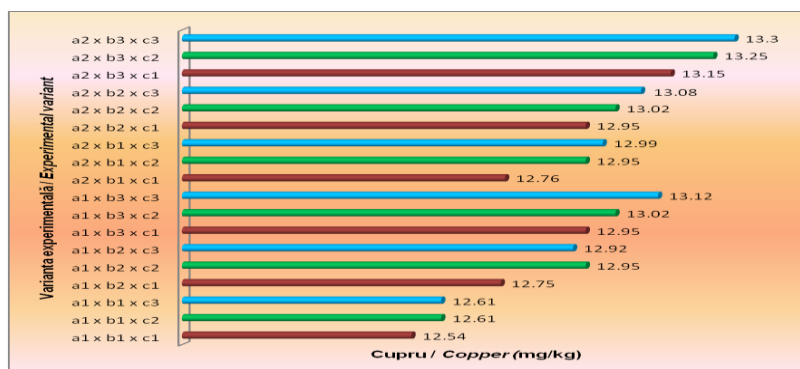


Fig. 2. Content of Copper (Cu) in soybeans, the average of the years 2009-2011, obtained in the conditions of Viișoara – Turda

Conclusion

Irrigation and fertilization applied on the soybean culture greatly influenced the content of metals in grains, during the period of research, 2009-2011. The variety Felix had the most positive reactions on the two factors, followed by variety Eugen. After analyzing the results it is noted that the organic fertilization is an increase in the metal content of the grain so it is recommended that before applying an organic fertilizer to carry out the determination of metals in soil and organic compost.

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