



IMPACT OF DEFICIT IRRIGATION ON YIELD AND CHEMICAL PROPERTIES OF SOYBEAN SEEDS IN TEMPERATE CLIMATE

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Summary: The goal of this research is to determine the effects of different levels of water deficit (I_{100} : full irrigation, I_{65} : 35% deficit, I_{40} : 60% deficit and I_0 : no irrigation) on yield and chemical composition of soybean [*Glycine max* (L.) Merr.] grown in Srem region of Serbia. Water deficit significantly affected the yield and chemical composition of soybean seeds. The lowest (1.63 t/ha) and the highest (3.21 t/ha) seed yields were obtained from I_0 and I_{65} treatments, respectively. Furthermore, the highest protein (1092 kg/ha) and oil (563 kg/ha) yields were observed in I_{65} treatment. Lower and higher irrigation levels from I_{65} decreased the protein and oil yields. Our data indicated that irrigation generally increased K, P, Mg, Mn, Cu, Zn and B concentrations and decreased Ca and Fe concentrations in soybean seed. It was clearly observed that full-watered treatment (I_{100}) provided no potential benefit in terms of soybean yield and chemical composition. For higher economic yield and good nutritional quality, water-saving treatment I_{65} could be suitable in soybean management in Srem region of Serbia as in other regions with similar soil and climate conditions.

Key words: soybean, drought stress, nutrient, protein and oil yield, mineral content

INTRODUCTION

In view of its unique chemical composition, soybean [*Glycine max* (L.) Merr.] is one of the most important crops worldwide. People have been consuming soybean for thousands of years and many newly-developed products are based on soybeans (Liu, 1997). Soybean is grown in Serbia on about 159,000 ha; annual yields range from 1.7 to 3.5 t ha⁻¹, or are 2.5 t ha⁻¹ on average (Statistical Yearbook of the Republic of Serbia, 2015). The total annual output of 399,000 tons is not sufficient to meet the national demand. In Serbia soybean is mostly rainfed. Low and variable yields are generally caused by low precipitation levels and uneven distribution during the growing season.

Compared to other crops, soybean requires a lot of water for good quality and high yields (Sweeney et al., 2003). Still, soybean is largely rainfed in regions where there is propensity for drought (Kim et al., 2007). Water stress during the growing season is harmful to soybean development (Karam et al., 2005) and significantly reduces yields if it occurs in the flowering and podding stages because the flowers and pods are shed (Liu et al. 2003). Soybean yield and quality are sensitive to irrigation (Liu et al., 2004). However, there is a significant spatial and temporal variability of rainfed and irrigated soybean yields, which can be attributed to the soil, agrotechnical measures or their interactions. Knowledge of the chemical composition of soybean is expected to help determine how irrigation affects its nutritional value. No information is available on the effect of different irrigation levels on soybean yield and quality in the ecological conditions in Srem. Thus, the aim of this study was to evaluate the effects of different irrigation deficits on the yield and chemical composition of soybean grown on a silty loam soil in a temperate environment.

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