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Effect of herbicide and biostimulant treatment strategies on the contents of minerals in soybean seeds

Dorota Gawęda[1], Jan Buczek[2], Sylwia Andruszczak[1], Małgorzata Haliniarz[1]

**[1] Department of Herbology and Plant Cultivation Techniques
University of Life Sciences in Lublin, Lublin, Poland
[2] Department of Crop Production
University of Rzeszów, Rzeszów, Poland**

Abstract

A way to alleviate various abiotic stresses in plants is to use biostimulants, as they improve photosynthetic efficiency, plant growth and root development, thereby facilitating the uptake of nutrients. The aim of this study was to assess the effect of biostimulant application with concomitant various chemical weed control strategies on the contents of selected macro- and micronutrients in soybean (*Glycine max* (L.) Merr.) seeds. A field experiment with soybean cultivation was conducted in 2020-2022 at the Experimental Station in Czesławice belonging to the University of Life Sciences in Lublin (Poland). The first experimental factor considered was the herbicide protection: (A) no herbicides, (B) soil herbicide Boxer 800 EC (prosulfocarb), (C) foliar herbicide Corum 502.4 SL (bentazone, imazamox) + Dash HC adjuvant (methyl oleate, fatty alcohol), and (D) soil herbicide Boxer 800 EC + foliar herbicide Corum 502.4 SL + Dash HC adjuvant. The second experimental factor was the biostimulant type: (a) no biostimulant, (b) Asahi SL (sodium para-nitrophenolate, sodium ortho-nitrophenolate, sodium 5-nitroguaiacolate), (c) Aminoplant (organic nitrogen, ammonia nitrogen, free amino acids, organic carbon), and (d) Kelpak SL (auxins, cytokinins). Herbicide protection entailing the use of Boxer 800 EC followed by Corum 502.4 SL (D) exerted the most beneficial effect on the contents of nitrogen and magnesium in soybean seeds. Phosphorus accumulation in the seeds was promoted only by the soil herbicide Boxer 800 EC applied immediately after seed sowing, while suppressed by the application of the foliar herbicide Corum 502.4 SL. Among the biostimulants tested, Kelpak SL from *Ecklonia maxima* algae elicited the most beneficial effect on the nitrogen, phosphorus and calcium contents in soybean seeds. In turn, the Aminoplant biostimulant caused a significant increase in the contents of nitrogen and iron in soybean seeds compared to the no-biostimulant variant.

Keywords: *Glycine max* L., macronutrients, micronutrients, herbicides, biostimulants

Sylwia Andruszczak, Assoc. Prof., PhD, Department of Herbology and Plant Cultivation Techniques, University of Life Sciences in Lublin, Akademicka 13, 20-950 Lublin, Poland, e-mail: sylwia.andruszczak@up.lublin.pl
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