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Effectiveness of a soy protein hydrolysate on lettuce growth and quality

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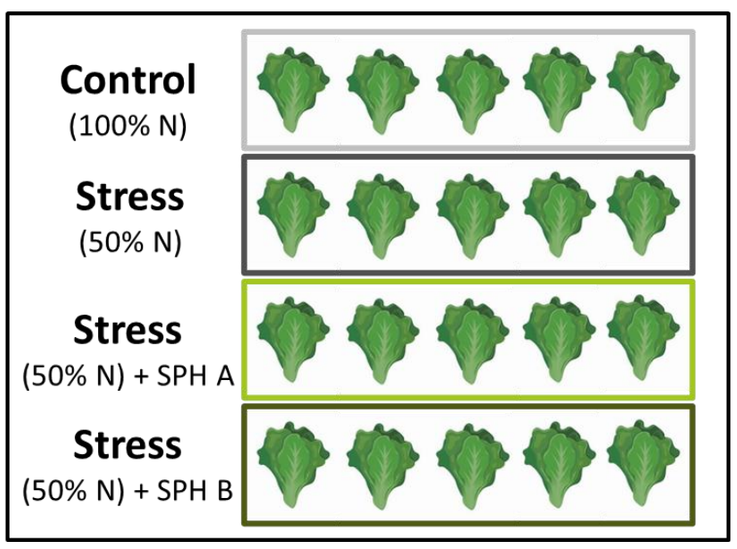
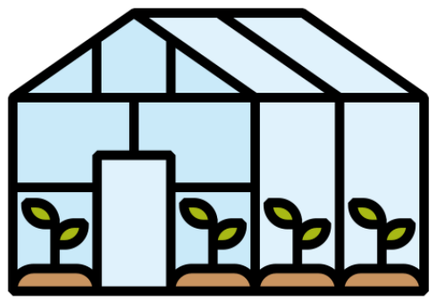
INTRODUCTION & AIM

In recent decades, the scientific community, in collaboration with private companies, has proposed some technological innovations to improve the quality of agricultural products and make agriculture more sustainable, leading to a significant reduction in the use of fertilisers[1]. Among these, biostimulants represent a promising innovation in agriculture. Protein hydrolysates are a category of biostimulants obtained through hydrolysis of protein-rich biomass. Enzymatic hydrolysis, which is based on the use of proteases, is a viable alternative to chemical hydrolysis because it can be performed under mild conditions, avoiding side reactions and without decreasing the nutritional value of the protein source[2].

The objective of this work is to examine the effects of **two soy protein hydrolysates (SPHs)**, namely **SPH A** and **SPH B**, on lettuce (*Lactuca sativa*, var. Batavia Canasta green), under no stress conditions and in conditions of reduced NPK nutrition, in terms of both yield and other parameters.

METHOD





Greenhouse conditions:
25 ± 3 °C, 16 h photoperiod

Nutrients used for fertilization were: $Ca(NO_3)_2$, NH_4NO_3, K_3PO_4 and K_2SO_4. Destructive analyses were performed, such as total fresh biomass (calculated considering a plant density of 10 plants per square meter), chlorophylls *a+b* and carotenoids[3], phenol index and anthocyanin[4], nitrate content[5], total sugars[6].

RESULTS & DISCUSSION

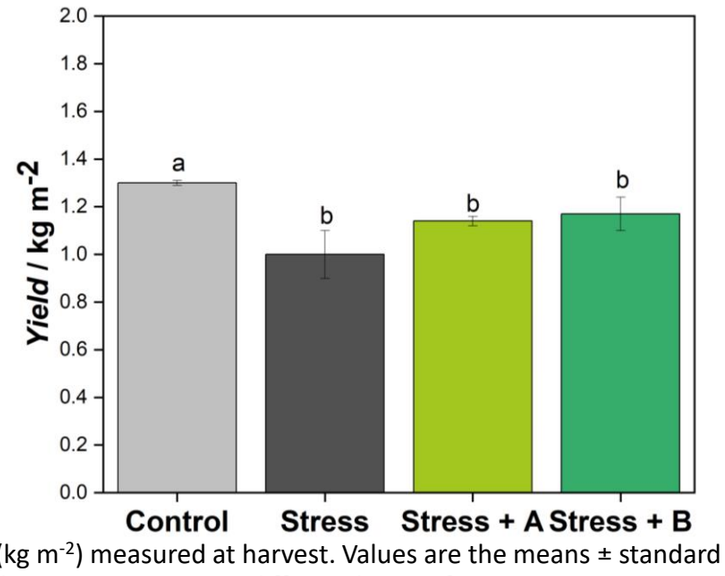


Figure 1. Yield (kg m^{-2}) measured at harvest. Values are the means ± standard errors (n=5). Data were subjected to one-way ANOVA, different letters if present represent significant differences among treatments (P<0.05).

Yields obtained after treatments with SPH A and SPH B were slightly higher (+14% and +17%, respectively) with respect to stress conditions (***Figure 1***). Results obtained for chlorophyll *a+b*, carotenoids and total sugars are not statistically significant (***Table 1***).

	Chlorophyll *a+b* (µg mg^{-1}) FW	Carotenoids (µg mg^{-1}) FW	Total sugar (mg g^{-1}) FW	Nitrate (mg kg^{-1})
Control	0.9 ± 0.3	0.2 ± 0.1	2.7 ± 0.8	1054 ± 16 (a)
Stress	0.9 ± 0.6	0.2 ± 0.1	5 ± 2	238 ± 7 (b)
Stress + A	1.0 ± 0.3	0.2 ± 0.1	4.8 ± 0.7	299 ± 7 (b)
Stress + B	0.9 ± 0.4	0.2 ± 0.2	3 ± 1	203 ± 7 (b)

Table 1. Chlorophyll *a+b*, carotenoids, total sugars and nitrate content on lettuce leaves. Values are the means ± standard errors (n=5). Data were subjected to one-way ANOVA, different letters if present represent significant differences among treatments (P<0.05).

CONCLUSION

These results confirmed that biostimulants cannot fully replace fertilizers but could be really helpful to decrease the quantity of mineral nutrition or help in nutrient deficiency. However, to achieve this goal, a deep investigation is necessary, in order to define not only the NPK uptake for each cultivar, but also the application time and dose of protein hydrolysate for each crop and environmental conditions.

FUTURE WORK

- Evaluation of effectiveness of soy protein hydrolysates (SPHs) on different cultivars
- Evaluation of effectiveness of different molecular weight fractions of SPHs obtained by ultrafiltration

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