

Effects Of Fish Protein Hydrolysate On Lettuce Growth/Development Under Controlled Conditions

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Introduction

One of the main components of Mediterranean diet is the consumption of fish. In fact, it is recommended to eat more fish (at least twice a week) than meat due to its high-quality protein content, low fat content, and importance as a source of vitamins and minerals (Prato and Biandolino, 2015). In Liguria region, as other coastal areas, the quantity of fish by-product is high. For a sustainable use of this resource and to increase the sustainability of crops cultivation, the objective of this study was to assess the effect of some foliar plant biostimulants with a fish by-product protein hydrolysate, on the growth and development of lettuce (*Lactuca sativa* L. ‘Summerbel’) in green-house conditions.

Materials and Methods

Lettuce (*Lactuca sativa* L., cv. ‘Summerbel’) seeds were sown in Petri dishes. After two days, seedlings were transferred to pots and grown in green-house at 25°C and R.H. 50%. All applied treatments (Table 1) were obtained within the FISH (PSR Regione Liguria) project.

Table 1. Description of treatments applied to lettuce plants.

Treatment	Acronym	Dilution	Description
Control (-)	Ctrl	-	Only tap water
Control (+)=commercial product	CP	1/750	FISH-MIX®, Biobizz
Control (+)=fermented hydrolysed nutrient	Ctrl-FH	1/500	FH FISH 15
Control(+)=basified fermented hydrolysed nutrient	Ctrl-BFH	1/500	BFH FISH 15
Hydrolyzed product	H	1/500	FISH 15ID
Basified-hydrolyzed product	BH	1/500	FISH 15IDB
Fermented-hydrolyzed product	FH	1/500	FISH 15IDF
Basified-fermented-hydrolyzed product	BFH	1/500	FISH 15IDFB

Foliar application of treatments was carried out at a rate of 4 mLplant⁻¹ at 24, 31 and 38 days after sowing. Each treatment was applied on 11 plants. Morphological (plant height and number of leaves) as well as physiological (leaf chlorophyll, flavonoids, anthocyanins content and the nitrogen balance index - NBI) parameters were monitored during crop development (31, 38 and 44 days after sowing). In addition, at the 44 day after sowing, the fresh and dry aerial biomass of plants were evaluated.

Results

The BFH treatment increased significantly the number of leaves/plant by 10% and 21% at 38 and 44 days after sowing, respectively, compared to control plants (Fig. 1 and Fig. 2). Moreover, plants treated with BFH were significantly higher than control plants by 18% and 20%, respectively at 38 and 44 days after sowing, respectively. The chlorophyll content of leaves, NBI and fresh dry weight of plants treated with BFH were significantly higher than control plants, at the 44th day after sowing (end of the experiment), by 46, 84 and 38% respectively. However, the flavonoids content of plant leaves treated with BFH product was significantly lower than control plants by 23% at the last measurement (44 days after sowing; data not shown).

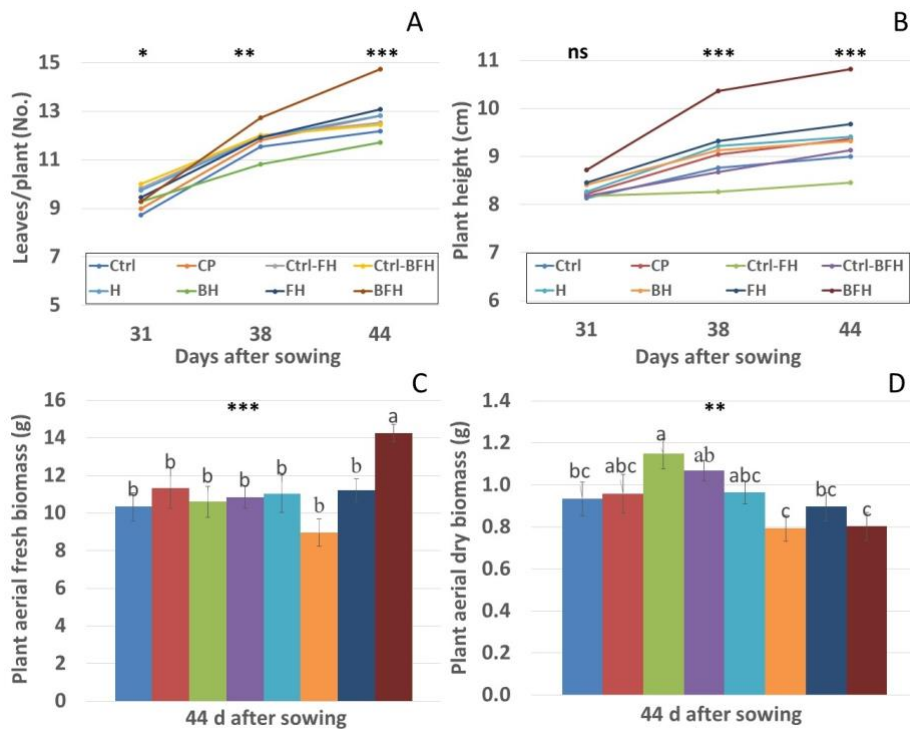


Figure 1. Effect of treatments on lettuce in green-house conditions on number of leaves/plant (A) and plant height (B) 31, 38 and 44 days after sowing, and on aerial fresh biomass (C) and aerial dry biomass (D) 44 days after sowing. Significance levels of post-hoc Tukey's HSD tests are indicated as ns: $p > 0.05$; *: $p \leq 0.05$; **: $p \leq 0.01$; ***: $p \leq 0.001$.



Figure 2. Plants of lettuce at the end of the experiment. From left to right: Control plant (ctrl), plant treated with fermented hydrolysed product (FH) and plant treated with basified fermented hydrolysed product (BFH).

Conclusions

In general, plants treated with BFH product have demonstrated a significant higher growth of morpho- physiological parameters, compared to plants treated with other products and in particular water-treated (control) plants.

Literature

Prato E. and Biandolino F. 2015. The contribution of fish to the Mediterranean diet. In *The Mediterranean Diet* (pp. 165-174). Academic Press.

FISH "Fertilizzante Idrolizzato Suolo e Habitat, effetti sulle colture e sul suolo di un fertilizzante/biostimolante da composti organici animali e vegetali per il territorio ligure". PSR 2014/2020 Regione Liguria - M016.02.