



Innovative use of biostimulant products to optimize lettuce production

Domenico Ronga¹, Enrica De Falco¹, Francesco Mellone¹, Emma Lanzara¹, Antonella Vitti¹

¹ Dipartimento di Farmacia, Univ. Di Salerno, Autore corrispondente: dronga@unisa.it

Introduction

Horticultural nursery activity is an essential segment of modern agriculture to assure high-quality seedlings, able to reach a well-developed and functional root system, environmental adaptation, tolerance to biotic and abiotic stresses. Hence, nursery agronomic management is crucial for the quality of seedling and its subsequent field performance. In this field too, research is increasingly focusing on sustainable methods like the adoption of the biostimulant. The aim of this study is to compare the yield of head lettuce intended for fresh market, in a greenhouse cultivation, after the transplant of the seedlings treated only at nursery level with different combinations of microorganism-based – biostimulant products (commercial microbial consortium and compost tea) (Fig. 1A).

Materials and Methods

The trial was conducted at “Futura Farm” (Eboli – SA), specialized in the production of horticultural species for fresh market and minimally processed products (baby leaf). The seedlings of lettuce, var. Foster, were transplanted in a tunnel (February 19th, 2021) on mulched soil using dark plastic film and with micro-irrigation system (drip-line) (Fig. 1B). The experimental scheme adopted was a randomized block design with four replicates for each treatment; each plot consisted of 8 plants. The preliminary phase of the trial was the preparation of the seedlings at the specialized nursery “CO.VI.MER.” (Battipaglia - SA). The seeds of lettuce were sown on peat cubes and the following treatments were performed (Fig. 1A): control without any treatment (T0); 90 µl per cube of a solution (1:100 v/v) with the commercial microbial consortium “Ryzo Pep Up”, at sowing (T1); 90 µl per cube of a solution (1:100 v/v) of compost tea prepared from vermicompost (Fattoria Gallorosso, Matera) distributed at sowing and at the phase of the first true well expanded leaves (T2); combination of the two treatments T1 and T2 (T3). At the end of the cycle (Fig. 1C), four lettuce heads for each plot were randomly chosen (49 days after the transplant) and height, head and collar diameters, fresh weight, dry matter content, and SPAD index were determined. All data were expressed as means ± standard error; significant differences were determined by ANOVA. Differences between the means were analyzed using the Tuckey test at P < 0.05.

Results

The results relating to the harvest of the heads, at the end of the cycle, are reported in Table 1. From the data it is possible to observe that the height and the diameter of collar were not influenced by treatments, as they are probably parameters strongly correlated to the variety. However, the treatments greatly influenced the results relating to the yield. The head diameter was greater than the control in all treatments, with no significant differences among them. Regarding the fresh weight of the head, T2 and T3 showed a high weight increase with respect to the control T0, between 88% and 105%. The highest values were achieved with the T3 treatment, corresponding to the use of microbial consortium in combination with compost tea and T2 only using compost tea distributed at sowing and at the phase of the first true well expanded leaves. The SPAD index did not record any differences between the investigated treatments. Finally, the dry matter content did not differ between the treatments and the control, and this ensures in any case a good shelf life of the product.

Table 1. Results related to the harvest of heads at the end of the cycle. Mean values followed by different letters are different at P < 0.05 according to analysis of variance; ±, standard deviation.

Treatments	Height (cm)	Head diameter (cm)	Collar diameter (cm)	Head fresh biomass (g)	Dry matter (%)	SPAD
T0	13.3 ± 0.4a	25.5 ± 0.5ab	1.9 ± 0.3a	271.8 ± 75.4b	6.5 ± 0.2a	36.1 ± 0.6a
T1	13.4 ± 1.0a	29.0 ± 2.4a	2.0 ± 0.1a	434.5 ± 77.4ab	6.7 ± 0.2a	36.9 ± 0.3ab
T2	13.7 ± 1.2a	29.3 ± 0.4a	2.2 ± 0.3a	512.0 ± 96.4a	6.0 ± 0.9a	37.9 ± 1.5a
T3	13.3 ± 0.3a	28.6 ± 3.2a	2.1 ± 0.3a	556.7 ± 53.5a	6.3 ± 0.6a	37.4 ± 0.6ab

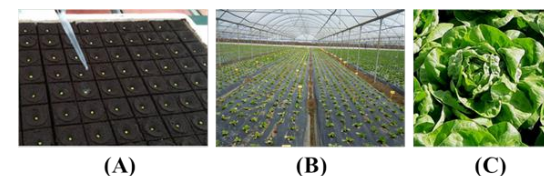


Figure 1. Biostimulant application (A); representative lettuce at transplant (B) and at the harvest (C).

Conclusions

The results, although referring to a single cultivation cycle, showed a positive effect of the treatments carried out during the preparation of the lettuce seedlings on the following heads production. In fact, the most important parameter (head fresh biomass) was increased using compost tea and compost tea + microbial consortium. These results, referred to a short cycle leaf crops, are interesting as it is possible to carry out the treatments only at nursery level without further subsequent interventions. The results confirm the positive effects on the production of products based on natural substances with high environmental compatibility even in innovative agricultural cropping systems.

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