



Leaf Fresh Weight and Nitrate Content of *Beta vulgaris* L. var. *cycla* Grown on Soil Treated with Biochar and Compost

Angela Libutti¹, Anna Rita Rivelli²

¹ Department of Science of Agriculture, Food, Natural Resources and Engineering, Univ. Foggia, IT, angela.libutti@unifg.it

² School of Agricultural, Forest, Food and Environmental Sciences, Univ. Basilicata, IT annarita.rivelli@unifg.it

Introduction

In a perspective of sustainable crop production, the use of organic amendments (biochar and compost) represents a strategy to improve soil fertility and promote plant growth.

The present study aims to evaluate whether mixing biochar and compost could affect leaf fresh weight and nitrate content in Swiss chard, with respect to the two amendments applied alone.



Materials and Methods

Swiss chard (*Beta vulgaris* L. var. *cycla*), grown in pot with sandy-clay-loam soil, was treated with biochar (**B**, from vine prunings) and three composts (**Cd**, from cattle anaerobic digestate + crop residues + wheat straw; **Cw**, vermicompost from cattle manure; **Cop**, from olive pomace), applied alone to provide 280 kg N ha⁻¹ or in a mixture (**B+Cd**, **B+Cw**; **B+Cop**) having a loading ratio of 50:50 (140+140 kg N ha⁻¹). In addition, a biochar-compost mixture having a double loading ratio (280+280 kg N ha⁻¹) was also evaluated.

At the harvest, leaf fresh weight (FW) and nitrate content (NO₃⁻) were determined.

Results

The leaf FW was:

- higher in B+Cd (280) and B+Cw (280) than B+Cd (140), B+Cw (140) and biochar alone, but not statistically different in B+Cd (280), B+Cw (280) and the composts alone (Cd and Cw) (Fig. 1a and 1c);
- not statistically different among B+Cop (280) and all the others treatments, but higher in Cop than B+Cop (140) and biochar alone (Fig. 1e);

The leaf NO₃⁻ content was:

- significantly higher in B+Cd (280) and B+Cw (280) than B+Cd (140) and B+Cw (140), but not statistically different among B+Cd (280), B+Cw (280), biochar and composts alone (Cd and Cw) (Fig. 1b and 1d);
- lower in B+Cop (280) and B+Cop (140) than biochar and compost alone, with the latter showing the highest value (Fig. 1f).

No synergic effect of biochar-compost mixtures was observed on both leaf FW and NO₃⁻ content.

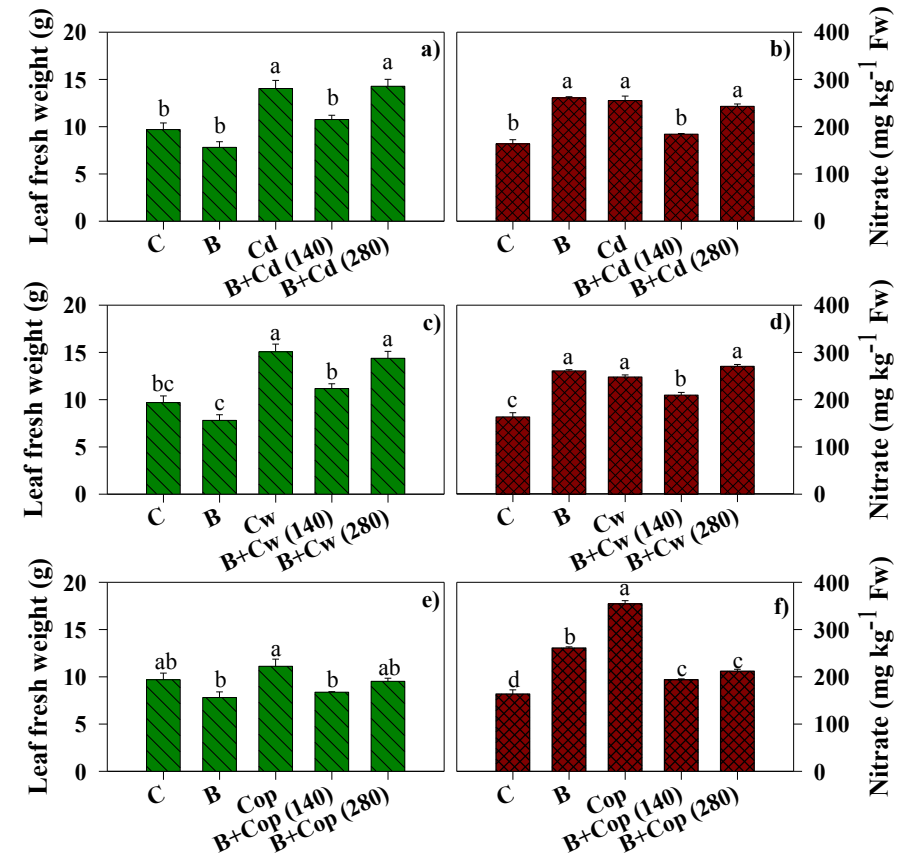


Figure 1. Leaf fresh weight (a, c, e) and nitrate content (b, d, f) in plants treated with biochar and composts, each applied alone or in mixture. Data presented in each graph were analysed by one-way ANOVA followed by Tukey's test at p≤0.05. Values are means (n=4) ± s.e.

Conclusions

The compost showed to be the best soil management option to meet growth and quality of Swiss chard. Biochar didn't show any positive effect on leaf fresh weight, while influenced leaf nitrate content. Only the mixture at double loading ratio of biochar and compost (particularly composts from animal wastes) resulted in leaf fresh weight and nitrate content similar to compost added alone.