



Theme 1

Status and trends of global soil nutrient budget



Biofortification of Romaine lettuce (*Lactuca sativa L.*) on soils treated with zeolite chabazite and magnesium sulphate for better nutrition and sustainability

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INTRODUCTION

Lettuce (*Lactuca sativa L.*) is an important food source, one of the most popular vegetables in the world, and has low-calorie content, around 15 kcal/100g. It contains important nutrients such as Ca, P, K, Mg, Mn and Fe, essential in the diet and it has many properties for health. Italy is a large producer, consumer and exporter of lettuce (1). Mg is one of the most important trace elements for the human body. Specific dietary supplements rich in Mg are currently widely used (2). In this work, a case study is presented, referred to the biofortifying of "romaine lettuce" in Mg using an amendment with zeolite chabazite combined with magnesium sulphate.

METHODOLOGY

The pot test was carried out in the greenhouse at CREA-IT (42° 05' 50" N, 12° 38' 03" E). Duration of the experiment: about six weeks. A soil clay calcareous cambisols (pH 7,9) of good fertility was used. The vegetable used is *Lactuca sativa L. cv. Longifolia (Lam.) janchen*. Italian Zeolite is a chabazite, ϕ 0.6 - 2 mm. Magnesian fertilizer is a salt of K and Mg. To investigate the main effects and interactions of zeolite and Mg fertilizer, a full factorial experiment was adopted using a two-factors design combining 3 zeolite levels (0, 2, 4 kg m⁻²) and 3 Mg fertilizer levels (0, 30, 60 g m⁻²). The nine factorial combinations (treatments) were replicate in 4 randomized blocks (n. 36 pots), distributed carefully and mixed to the 0 - 15 cm layer of soil. Parameters considered of the lettuce: fresh and dry weight, height, number of leaves, leaf area index (LAI) and chlorophyll (SPAD index). (Fig.1)



RESULTS

- In our study few effects due to zeolite application were observed on the measured parameters.
- The height of the plants was lower in zeolite levels 1 and 2 compared to level 0.
- The SPAD index values showed higher contents of level 1 of zeolite, as well as level 2 of zeolite and level 1 of magnesium.
- Better yields were obtained in fresh weight at Mg level 2 in all combinations with zeolite. (Fig. 2)
- No differences were identified regarding the LAI.
- Plants with higher number of leaves were obtained with level 2 of zeolite and level 2 of Mg, despite the lower plants height. (Fig.3)

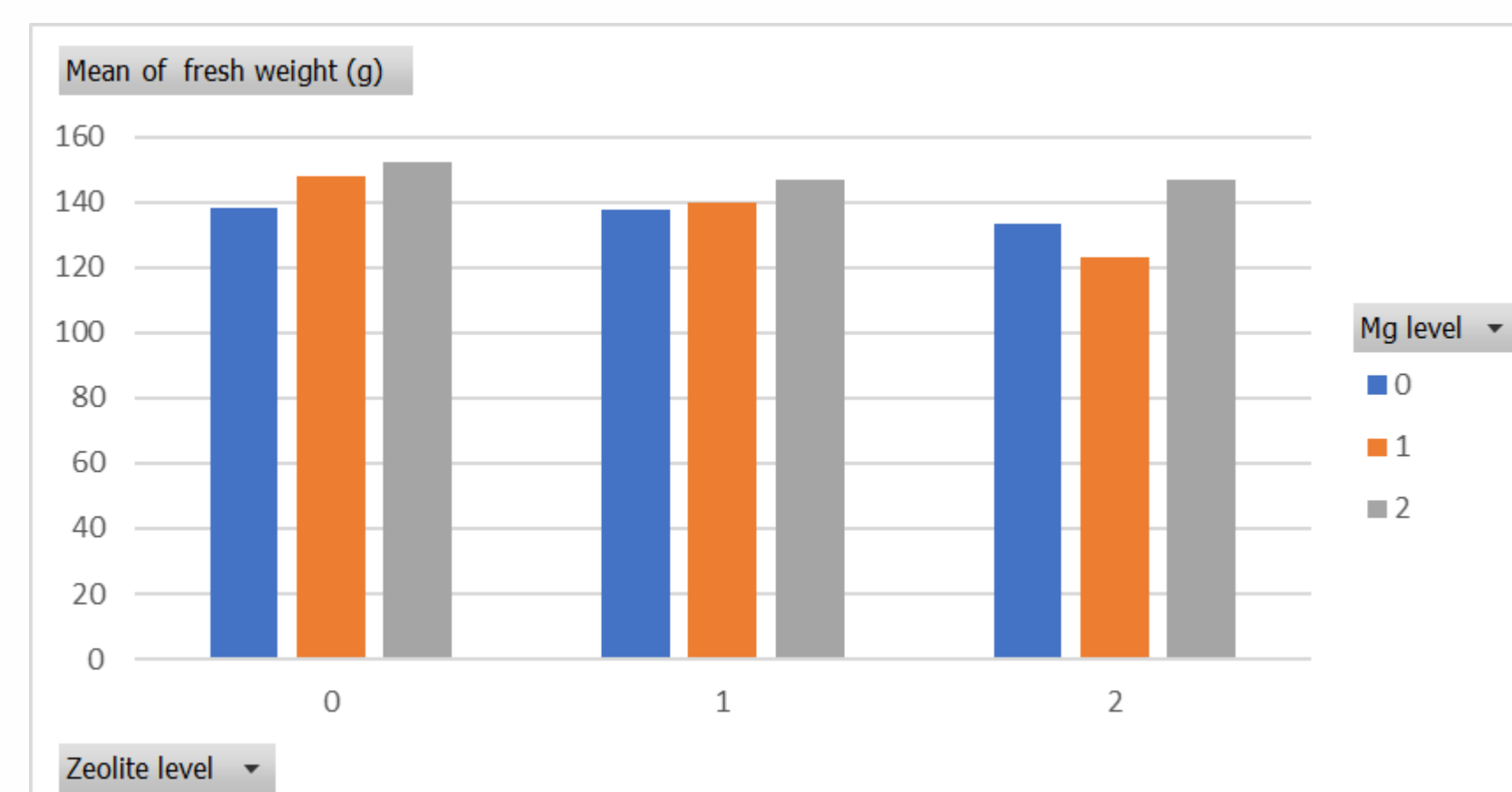
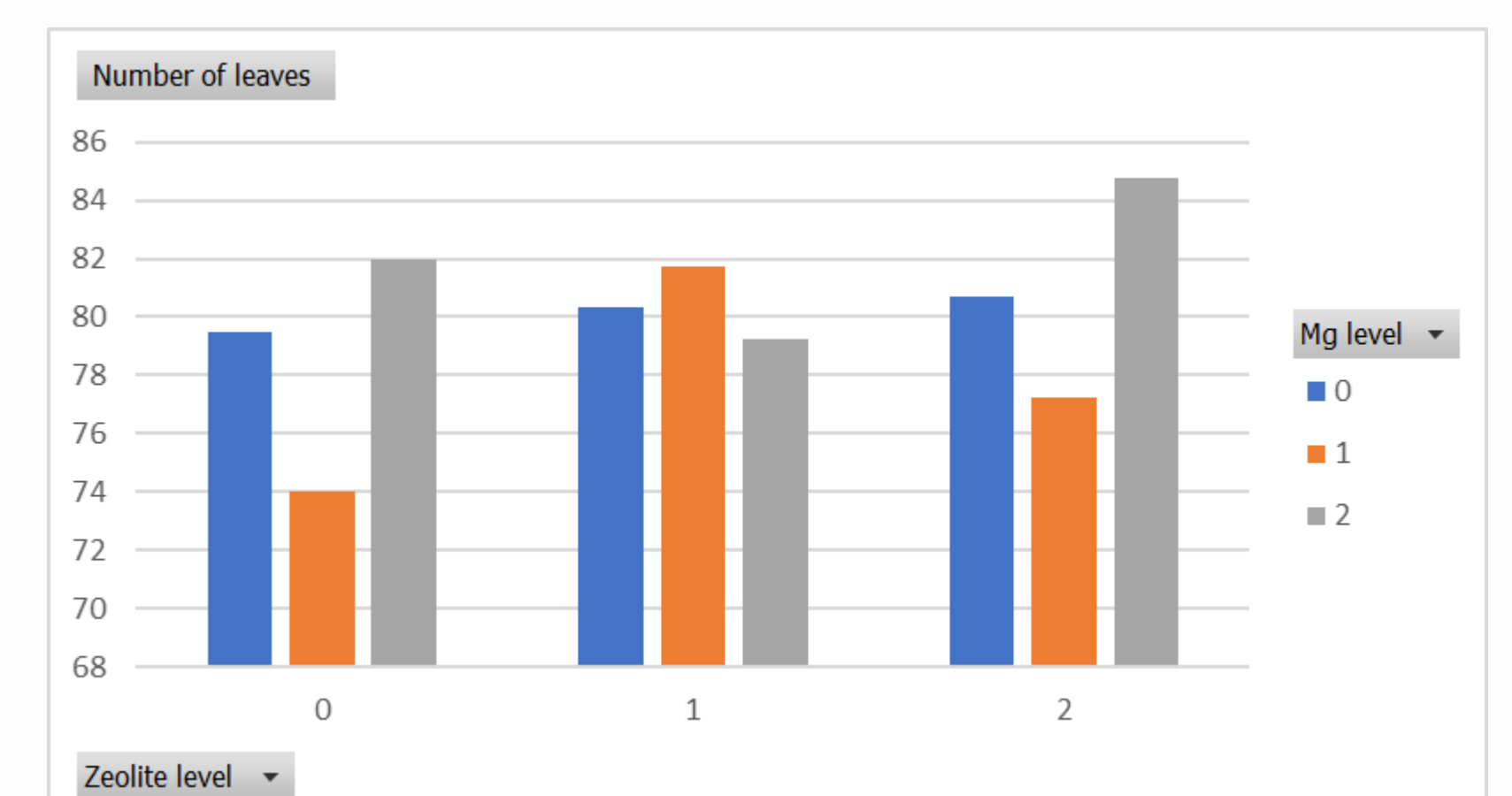


Fig. 2-3: Mean fresh weight _ Number leaves of lettuce

CONCLUSIONS

- Despite the results we did not have strong effects of the levels of zeolite and Mg used, the importance of the zeolite as amendment of natural origin is however confirmed.
- The good fertility of soil used together the probably temporary fixation effect of the ammonium ion by the zeolite did not allow to highlight evident effects on the lettuce yield in according with the results in similar soil on vegetables of other authors. (4)
- In conclusion the results of the test lead to continue further research on zeolite combined with other phytonutrients in different soils, in particular on degraded and poorly fertile soils where the effects of zeolite seem to be more evident, (3-4) with the aim of better nutrition for a better life.



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Fig.1 : Reliefs in pot trial of "romaine lettuce" in a greenhouse at the CREA-IT. Minolta SPAD-502 instrument.