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Nutrient Interactions in Natural Fortification of Tomato with Mg: An Analytical Perspective

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Abstract: In the human body, about 53% of Mg is involved in the development and maintenance of bone and other calcified tissues, but it also has a physiological role in protein synthesis, muscle and nerve functions, blood glucose control and blood pressure regulation. Nevertheless, Mg deficiency triggers electrolyte disturbance that can result in multiple symptoms, namely tremor, poor coordination, muscle spasms, loss of appetite, personality changes, and nystagmus. Complications may include seizures or cardiac arrest. To surpass Mg deficiency, biofortification is a strategy that can boost nutrient enhancement in food crops and can increase nutrient uptake and accumulation in the human body. Accordingly, this study aimed to develop a technical itinerary for Mg biofortification in *Lycopersicum esculentum* variety H1534. Tomato biofortification was promoted during the respective life cycle throughout six leaf applications with two different treatments (4% and 8%) of $MgSO_4$, equivalent to 702 and 1404 g ha^{-1}. At harvest, the biofortification index of Mg was 2.01 and 1.71 fold (after spraying with 4% and 8% $MgSO_4$, respectively), being found a synergistic trends only with Zn e Fe, whereas P did not varied significantly among treatments. Among treatments, relevant deviations could not be found for total soluble solids, height, diameter and color, yet minor changes in dry weight were detected. It is concluded that Mg biofortification of tomato variety H1534 can be carried out to add nutritional value to tomato based processed food products.

Keywords: *Lycopersicum esculentum* ; Mg Biofortification ; Nutrient interactions.

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Results and Discussion

Table 1. Mean values ± S.E. (n = 4) of Mg, Zn, Fe, Ca, P and K in tomatoes of *Lycopersicum esculentum*, variety H1534, at harvest. Different letters (a, b) indicate significant differences, of each parameter, between treatments (P ≤0.05).

Treatments	Mg	Zn	Fe	Ca	P	K
	mg/100g					
Control	58.0b ± 5.8	1.43b ± 0.11	14.9b ± 0.3	36.6a,b ± 1.2	263a ± 1.5	2788a ± 94
4% $MgSO_4$	116.3a ± 14.7	2.57a ± 0.08	17.8a ± 0.3	31.8b ± 1.0	257a ± 5.8	2300b ± 49
8% $MgSO_4$	99.2ab ± 7.7	1.91ab ± 0.25	17.6a ± 0.0	38.5a ± 1.9	256a ± 1.7	2673a ± 64

Relatively to the control, treated tomatoes with 4% and 8 % of MgSO4 showed an increasing contents of Mg (2.01 and 1.71 fold), Zn (1.80 and 1.34 fold) and Fe (1.20 and 1.18 fold), whereas Ca and K significantly lower values with 4% MgSO4. Moreover, P did not varied significantly among treatments.

Conclusions

Through foliar spraying with MgSO4, Mg contents increased in the tomato variety H1534, being the maximum content obtained at a spray concentration of 4%. Zinc and Fe showed a synergistic pattern of accumulation with Mg. Additionally, Mg biofortification did not show relevant changes in total soluble solids, height, diameter and color. However, minor changes in dry weight occurred in the treatment that showed the highest content of Mg. Accordingly, agronomic biofortification of tomato variety H1534 can be applied to increase this nutrient in tomato based processed food products.

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