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Limitation of mineral supply as tool for the induction of secondary metabolites accumulation in tomato leaves

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1 **PLANT PHYSIOLOGY AND BIOCHEMISTRY**2 **Limitation of mineral supply as tool for the induction of secondary metabolites**
3 **accumulation in tomato leaves**4 Tanja Groher,^{a*} Simone Schmittgen,^a Georg Noga,^a Mauricio Hunsche,^{a,b}5 a Institute of Crop Science and Resource Conservation – Horticultural Science, University of
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12 **ABSTRACT**

13 Agricultural residues are natural sources for secondary metabolites as high value ingredients
14 for industrial uses. The present work aims to exploit the accumulation potential of rutin and
15 solanesol in tomato leaves following nitrogen and general mineral deficiency in a
16 commercial-like greenhouse. Physiological responses of tomato plants were monitored non-
17 destructively with a multiparametric fluorescence sensor, and biochemical parameters were
18 determined by means of HPLC analysis. Nitrogen and general mineral limitation led to an
19 accumulation of rutin in young tomato leaves while solanesol concentration was higher in
20 mature leaves. In young leaves, the fluorescence indices SFR_R and NBI_G showed lower
21 values compared to control plants for both stress treatments. On the contrary, FLAV and
22 ANTH_RG values increased during the experiment, but no differences could be recorded in
23 mature leaves. However, correlation analysis indicates, that the FLAV index is not a reliable
24 tool to estimate the concentration of rutin and solanesol tomato leaves. To monitor fruit
25 yield/quality as primary objective of tomato production, fruits showing symptoms of blossom
26 end rot (BER) were counted before and after stress treatments. BER was determined more
27 frequently for plants grown under a general mineral deficiency, concluding that a practical
28 applicability at the end of fruit production is advisable. Our results indicate that by-products
29 from Solanaceae plants are promising resources for valuable bioactive leaf compounds. To
30 achieve the highest concentrations, the seasonal variation, the optimal environmental
31 conditions, the concentrations in different plant organs and varieties as well as different
32 production systems are of high interest for commercial implementation.

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