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Postharvest evaluation of microgreens and baby leaves at low potassium content

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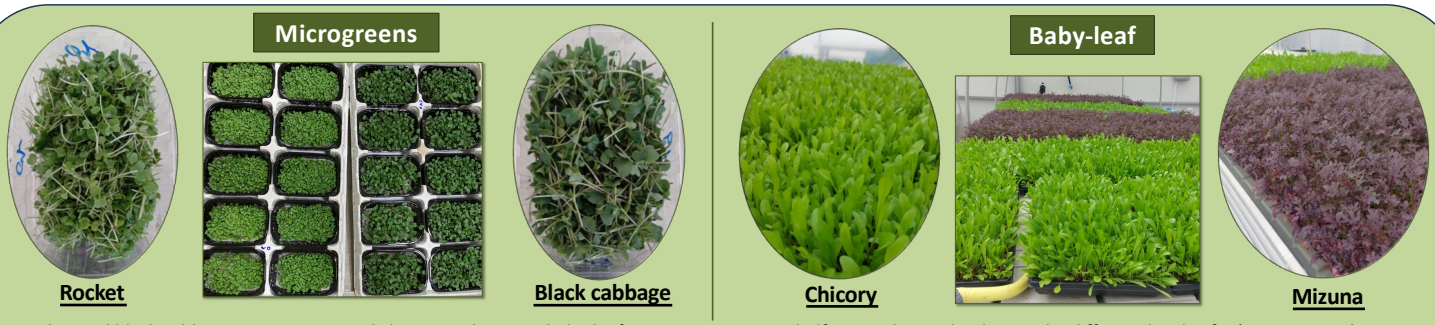
INTRODUCTION

In recent years, the demand for fresh-cut vegetables with improved nutritional composition to meet specific dietary needs has been constantly increasing. A new frontier of biofortification is represented by the possibility, in soilless cultivation systems, of modulating the concentration of dissolved nutrients in the nutrient solution (NS), aimed at producing plants with specific nutritional contents to obtain tailored foods. Fresh-cut vegetables produced with low potassium (K) input represent new tailored vegetable products for specific diets. **The conducted research concerned the postharvest storage of two classes of products cultivated with low K input: rocket and black cabbage microgreens and chicory and mizuna baby leaves.**

MATERIALS AND METHODS



Rocket and black cabbage microgreens and chicory and mizuna baby-leaf were grown using a half-strength Hoagland NS and 3 different levels of K (**K-0, K60, and K120** mg L^{-1} and **Low** (60 mg L^{-1}), **High** (120 mg L^{-1}), **Low-7d** (reduced K-dose only 7 d before harvest) for microgreens and baby-leaf, respectively). Both species, separated per K-treatment, were washed in a 2% sodium hypochlorite solution, drained at room temperature for 5 min and stored at 5 °C for 7 d in open polyethylene bags. At harvest and the end of the storage, the measure of main quality postharvest parameters (visual appearance, respiration rate, electrolyte loss and ammonium content) was performed

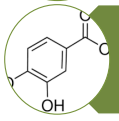
RESULTS AND DISCUSSIONS

Sensory and quality traits of both microgreens and baby-leaf species analyzed were not compromised by K reduction (K60 and Low-7d), proving high postharvest performances comparable to those cultivated with K120 and High (assumed as control).

In both microgreens and baby-leaf species, samples treated with K60 and Low-7d showed low values of respiration rate and ammonia content, considered as two key senescence markers, at the end of storage, with no statistical differences with the K references (Fig. 1 and 2).

Microgreens grown without potassium (K-0) exhibited a distinct VOC profile, whereas those cultivated with K60 and K120 showed similar aromatic compositions. In detail, the K60 treatment preserved key aroma compounds at levels comparable to K120 treatment (Fig. 3).

The reduction of K-level (K60) in microgreens did not compromise the total mesophilic count, revealing a presence of an expected microbial load considering the type of product and cultivation system.



The phytochemical analysis highlighted that all microgreens and baby-leaf species retained their characteristic profiles of phenolics, chlorophylls, and carotenoids, even under K restriction.

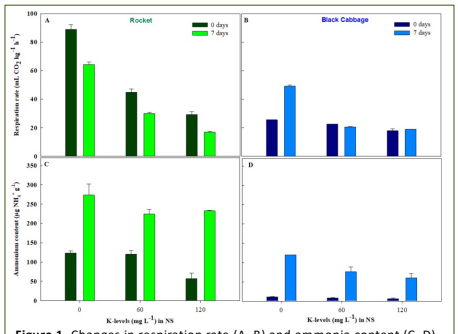


Figure 1. Changes in respiration rate (A, B) and ammonia content (C, D) in rocket and black cabbage microgreens cultivated with different K-levels

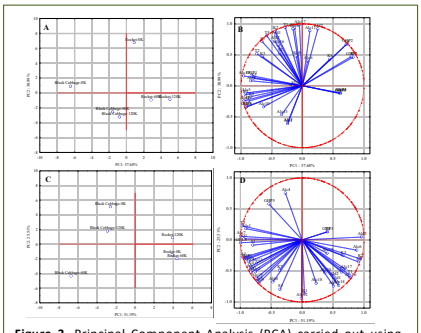


Figure 3. Principal Component Analysis (PCA) carried out using the VOCs analysed at 0 (A, B) and after 7 d (C, D) in rocket and black cabbage microgreens grown with different levels of K.

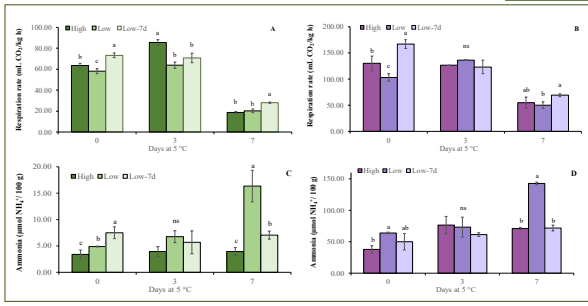


Figure 2. Respiration rate and ammonia content of Chicory (A, C) and Mizuna (B, D) baby-leaf treated with different K-treatments (High, Low, Low-7d) during the storage at 5 °C.

CONCLUSIONS

Rocket and black cabbage microgreens can be successfully cultivated under reduced potassium (K) regimes without compromising their overall yield and quality. Also the results on baby-leaf demonstrated that applying **a reduced dose of K at the end of the production cycle (7 d before harvest) (Low-7d) caused limited effects on baby-leaf physiological aspects**, without significantly affecting their postharvest quality. Although slight variations in total polyphenols were observed at reduced K levels, the overall nutritional and phytochemical quality remained high, supporting the potential of these product as **functional foods tailored for individuals requiring low-K diets**. Anyway, a species effect should be considered.

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