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Characterizing Calcium Supply in Tomato Fruit Development Using Sr²⁺ as a Physiological Marker

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Calcium is a macronutrient that plays in all stages of development of tomato fruit such as cell division, cell metabolism, cell wall formation, and fruit maturation. The Ca concentration in these stages showed a decreasing profile as the fruit developed. Since Ca reaches upper plant tissues through root-to-shoot uptake, its supply is strongly reduced as the xylem loses its functionality in fruits, thereby inducing several Ca-related physiological disorders, such as blossom end-rot, as well as a significant reduction in productivity. In this regard, we aim to characterize the Ca tomato supply during tomato fruit development using Sr²⁺ as a physiological marker. The roots of tomato plants were exposed to a nutrient solution with Sr spiked at 40 mg/L for 36h, afterward, fruits at different phenological stages were harvested. Synchrotron analysis carried out in longitudinal freezing dried slices of tomato fruits showed Sr²⁺ distributed throughout the fruit in the initial stages of development. On the other hand, fruits at the cell expansion stage showed Sr²⁺ concentration mainly at the base, indicating that the root supply of Ca²⁺ is reduced in the cell expansion phase which lowers Ca²⁺ at the top of the tomato fruit.

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