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Development of High Mannan and High Vitamin C Tomato Cultivation Methods under Salinity Conditions Using Seawater.

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Summary

Fruit composition is considered one of the differentially important traits that determine eating quality and consumer preference in major horticultural crops. Salt stress causes osmotic stress and ion toxicity, which often interfere with plant growth and metabolism. However, it is known that tomatoes grown in saltwater under salt stress conditions can produce fruits with high commercial value due to the accumulation of sugars such as glucose and fructose, amino acids such as proline, and γ-aminobutyric acid, and vitamin C, ascorbic acid. However, there have been few research reports on how vitamin C and other highly functional ingredients accumulate. It is known that polysaccharides and sugars are synthesized and degraded during the fruit ripening process of tomato fruit, accompanied by changes in fruit firmness and size (Takizawa et al., 2014). In this study, we found that vitamin C accumulates in the pericarp during saltwater cultivation, with a concomitant decrease in the amount of mannan in the tomato fruit pericarp and seeds. Vitamin C has some common aspects with the mannan synthesis pathway, and a trade-off relationship may occur between the two over the substrate mannose. In other words, saltwater cultivation is mannose deficient. In this experiment, it was confirmed that the pericarp of green unripe fruit contained almost the same amount of vitamin C as ripe red fruit. Since tomatoes are shipped in an unripe state, a cultivation system combining saltwater and mannan that can produce tomatoes containing the same amount of vitamin C in unripe fruit as in ripe fruit would be effective methods of transferring this technology to agricultural technology.