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Introduction

Tomato exhibits genetic diversity in fruit size, shape and color—factors that are useful for breeding. Generally, fruit size depends on cell division and cell expansion, and fruit development consists of a cell division period and a cell expansion period. Therefore, we focused on the regulation mechanism of cell division as one of the determining factors for fruit size. In *Arabidopsis* roots, HIGH PLOIDY 2 (HPY2) induced by auxin reportedly regulates cell division. In this study, auxin and anti-auxin treatments and the expression analysis of *SlHPY2*—a tomato homolog gene of *HPY2*—were performed to reveal the effect of auxin on cell division in tomato fruit.

Materials and Methods

For auxin and anti-auxin treatment, tomato 'Ailsa Craig' fruit was dipped into 1-naphthylacetic acid (NAA) every day from day 4 post anthesis, or into anti-auxin every day from anthesis. Fruit diameter was measured at days 8 and 15 post anthesis. Paraffin sections prepared from their pericarp were dyed, and the number of cells per unit length in the mesocarp was measured. Total RNA was extracted from the fruit and *SlHPY2* expression was measured through quantitative real-time PCR.

Results and Discussion

In NAA treatment, the number and size of cells did not differ between NAA-treated fruit and the control on day 8 post anthesis, whereas the number of cells was larger and the cell size was smaller in the treated fruit than in the control on day 15 post anthesis. In the expression analysis, *SlHPY2* mRNA levels did not differ between NAA-treated fruit and the control on day 8 post anthesis, whereas the levels rose with NAA concentration on day 15 post anthesis. In the anti-auxin treatment, the number of cells was smaller and the cell size was larger in the treated fruit than in the control on both days 8 and 15 post anthesis; however, *SlHPY2* mRNA levels did not differ between the anti-auxin treated fruit and the control. These results suggest that auxin promotes cell division, and that further study is necessary to elucidate the role of SlHPY2.