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A tomato prolyl 4 hydroxylase is involved in fruit growth and abscission

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Proline hydroxylation is a major post-translational modification of hydroxyproline-rich glycoproteins (HRGPs) that is catalyzed by prolyl 4-hydroxylases (P4Hs). Their involvement in plant growth and development has been recently investigated in Arabidopsis, tobacco and carnation. Therefore, transgenic tomato plants expressing an RNAi construct in order to suppress tomato P4H3 as well as over-expression lines were produced. All of the lines exhibited a reduction in fruit diameter while the number of viable seeds was significantly reduced in RNAi lines. Towards investigation of the fruit size reduction phenotype, the gene expression of Arabinogalactan proteins (AGPs) while and their protein levels were determined using an immunolocalization approach and western blot analysis during stages of fruit cell division and expansion. A delay was also observed in fruit pedicel abscission which was associated with expression of key abscission progression genes such as cell wall hydrolases. Moreover, alterations were observed on the growth of flower pedicels and the AGPs content was determined in the abscission zones using an immunolocalization approach. The results indicate that suppression of tomato P4H3 might be responsible for the reduction in AGPs at the post-translational level content inducing the observed phenotypes. Collectively, these results indicate that P4H3 plays a significant role in tomato fruit growth and abscission.

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