

Plants coordinate the timing of flower opening with pollen and gynoecium maturation to achieve successful pollination. However, little is known about how the coordination is executed. We found that flower bud development was paused immediately before flower opening in a jasmonic acid (JA)-insensitive tomato mutant, *jai1-1*. Phytohormone measurement and RNA analysis in flower buds revealed that newly synthesised JA peaked at two days before flower opening and the expression of a transcription factor gene *SIMYB21* delayed in *jai1-1*. Buds of transgenic tomato plants expressing an artificial repressor, *AtMYB24-SRDX*, which was expected to impede the function of *SIMYB21*, aborted flower opening and resembled those of *jai1-1*. Furthermore, the *AtMYB24-SRDX* plants produced abnormal pollen grains deficient in germination and pistils that did not support pollen tube elongation. We concluded that JA facilitates the expression of *SIMYB21*, which coordinates flower opening, pollen maturation, and gynoecium function in tomato.

Jasmonic acid stimulates *SIMYB21* expression, which is required for coordinated flower opening and fertility in male and female organs in tomato.