Title Expression of ROP/RAC GTPase genes in postharvest loquat fruit in association with senescence and cold regulated lignification

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Abstract

ROP/RAC GTPases regulate various development processes and play important roles in plant defense responses. Recently, lignification or secondary cell wall formation related ROP members were reported in rice, zinnia, cotton and *Eucalyptus*. The present study aimed to investigate the possible association of loquat ROPs with flesh lignification under different temperatures. Four ROP cDNA fragments, *EjROP1.1*, *EjROP1.2*, *EjROP2* and *EjROP3*, were isolated from 'Luoyangqing' (LYQ) loquat fruit, and all of them shared over 80% nucleotide identity with known ROPs from other plants. Sequence analysis revealed that EjROP1.1, EjROP2 and EjROP3 might be functional while EjROP1.2, with mutated C-terminal resulted from a 65 bp deletion in the corresponding nucleotide sequence as compared with *EjROP1.1*, might be dominant-negative and consequently act as a negative regulator of ROP signal transduction. Increase in expression of *EjROP1.1*, *EjROP2* and *EjROP3* was observed during first 4 or 6 d of storage at 20 °C and was positively correlated with the increase in flesh firmness. Expression of *EjROP1.2* was constantly low under 20 °C but was quickly, within 6 h, induced under 0 °C, and it increased by about 20 times within 24 h. The expression was induced under 5 °C as well but not so strong as that under 0 °C, and transfer of fruit from 5 °C to 0 °C re-stimulated the expression. The possible roles of EjROPs played during senescence and cold regulated lignification was discussed, and the simultaneous increase in the expression of three functional EjROPs and the negative regulator EjROP1.2 was suggested to be important for maintaining a ROP rheostat to protect cells from excessive lignification. To our knowledge, this is the first study on a dominant-negative ROP resulted from a deletion mutation, and a ROP responded to low temperature.