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学 位 論 文 要 旨

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題目: Studies on flower bud formation and its related genes in evergreen azalea *Rhododendron* × *pulchrum* ‘Oomurasaki’

(常緑性ツツジ ‘大紫’ の花芽形成と開花関連遺伝子に関する研究)

Evergreen azalea cultivars that belong to the subgenus *Tsutsusi* have been improved by selection of mutants and interspecific hybridization of wild species. However, no molecular information on flower bud formation in evergreen azalea is presently available. In this study, isolation of several flowering-related genes and analysis of their expression in the evergreen azalea ‘Oomurasaki’ (*Rhododendron* × *pulchrum*) were performed. In addition, the relationship between flower bud formation and expression of these flowering-related genes was investigated using ‘Oomurasaki’ plants grown under natural conditions. Lastly, effects of PGRs on flower bud formation were investigated in ‘Oomurasaki’.

Isolation and expression analysis of flowering-related genes in ‘Oomurasaki’

Isolation and expression analysis of flowering-related genes were carried out by RT-PCR, semi-quantitative RT-PCR, and RT-qPCR. Full-length sequences of *RpFT*, *RpSOC1*, *RpLFY*, *RpTFL1*, and *RpCEN*, and a partial sequence of *RpAP3*, were isolated from the shoot apex of ‘Oomurasaki’. Expression of these flowering-related genes was detected in vegetative and floral organs. These genes were expressed in the shoot apex and flower buds during the period of flower bud formation. During the experimental period, *RpFT*, *RpLFY*, and *RpAP3* were positively correlated with flower bud formation,

whereas *RpTFL1* was negatively correlated with flower bud formation. *RpCEN* expression showed no correlation with flower bud formation. These results indicated that *RpFT*, *RpSOC1*, *RpLFY*, *RpTFL1*, and *RpAP3* are involved in flower bud formation.

Environmental conditions and plant growth regulators affect flower bud formation in ‘Oomurasaki’

To investigate factors that affect flower bud formation in ‘Oomurasaki’, the expression patterns of flowering-related genes were analyzed during the period of flower bud formation in 2009 and 2010 in plants grown under natural conditions, and their expression was investigated in response to exogenous gibberellins (GA) and paclobutrazol (PAC) application.

In 2009, the flowering-related genes *RpFT* and *RpLFY* were expressed mainly on early August, whereas *RpTFL1* expression was decreased from mid-July. In 2010, *RpFT* and *RpLFY* were expressed mainly on early September, whereas *RpTFL1* was decreased from early September. Moreover, *RpAP3* were expressed mainly in early August 2009 and in early September 2010, which corresponded with the period of flower bud formation. Flower meristem formation occurred earlier in PAC-treated plants than in GA-treated plants. The *RpFT* expression level was higher in response to PAC application than in GA application. In contrast, expression of *RpSOC1*, *RpLFY*, and *RpTFL1* increased in response to GA application than in PAC application. These results indicated that temperature and both GA and PAC may affect flowering-related genes in flower bud formation.

Collectively, these results indicate that *RpFT*, *RpSOC1*, *RpLFY*, *RpTFL1*, and *RpAP3* are involved in flower bud formation, and that the expression patterns of these genes can determine the period of flower bud formation in ‘Oomurasaki’. In addition, environmental conditions and PGRs affected flower bud formation and its genes.