（学位第３号様式）

学 位 論 文 要 旨

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題　目	Functional analysis of FLOWERING LOCUS T(FT)-interacting proteins in citrus（カンキツにおける FLOWERING LOCUS T(FT)相互作用タンパク質の機能解析）

Shortening the juvenility is an important issue in breeding fruit trees such as Satsuma mandarin (*Citrus unshiu* Marc.). Decreasing the breeding period requires an inevitable understanding of the flowering process in woody plants for developing methods to shorten the breeding period and regulate the yield of tree fruits. FLOWERING LOCUS T (FT) acts as a transmissible floral inducer and can interact with other transcription factors (TFs) throughout the flowering system in *Arabidopsis*. In this study, two citrus orthologs of the transcription factors (TF) *VASCULAR PLANT ONE-ZINC FINGER1* (*VOZ1*)-like gene, *CuVOZ1* and *CuVOZ2*, two *FT*-like genes, *CuFT1* and *CuFT3*, were isolated from the Satsuma mandarin 'Aoshima'. *In vitro* Protein-protein interaction was confirmed between CuVOZs and CuFTs in the Y2H system. N-terminal 400 amino acids of CuVOZ1, consisting of three motifs: domain of unknown function 4749 (DUF4749), no apical meristem (NAM), and zinc coordination motif, were assumed to be involved in the CuVOZ1–CuFT1 and CuVOZ1–CuFT3 complexes. NAM and zinc coordination motifs were identified within the N-terminal 400 amino acids of CuVOZ2. DUF4749 was not found in the sequence of CuVOZ2. Docking simulation suggested that three motifs in CuVOZ1 participated in the interaction of the CuVOZ1-CuFT1 complex. Only the zinc coordination motif of CuVOZ1 was possibly involved in the interaction of CuVOZ1-CuFT3, CuVOZ2-CuFT1, and CuVOZ2-CuFT3 protein-protein complexes and phosphatidylethanolamine-binding protein (PBP) motif in exon 4 of CuFTs was predicted to be crucial for the interaction between CuVOZs and CuFTs. The distance between the amino acid residues involved in docking was varied in CuVOZs-CuFTs complexes. The distances were predicted to be from 2.69 to 3.37 Å in CuVOZ1–CuFTs complexes and from 1.09 to 4.37 Å in CuVOZ2–CuFTs complexes, respectively, suggesting that the forces between CuVOZs and CuFTs in the CuVOZs–CuFTs complexes were weak Van der Waals forces. Cys218, Cys223, Cys237, and His241 in CuVOZ1 and Cys216, Cys221, Cys235, and His239 in CuVOZ2 were suggested to bond with a Zn^{2+} in the Zn coordination motif region. Ectopic expression of 35SΩ:*CuVOZ1* and 35SΩ:*CuVOZ2* affected the morphology of transgenic arabidopsis. Flowering time, plant size, length of inflorescence, number of flowers and siliques, and formation of flower buds on the elongated stem were observed in the arabidopsis overexpressed with 35SΩ:*CuVOZ1.* Unlike 35SΩ:*CuVOZ1,* overexpression of 35SΩ:*CuVOZ2* in *Arabidopsis* affected the flowering time, length of inflorescence, and the number of siliques. These results indicate that *CuVOZ1* might act as a trigger for early flowering and might be involved in the elongation and branching of the inflorescence. The CuVOZ1–CuFT complexes might regulate cellular proliferation and the formation of new tissues and affect both vegetative and reproductive development. On the other hand, *CuVOZ2* might regulate both vegetative and reproductive development, act as a trigger for early flowering, and be involved in the elongation of inflorescence.