（学位第３号様式）

学 位 論 文 要 旨

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題　目	Research on inheritance of colors in *Eustoma grandiflorum* (Raf.) Shinn. flowers

The three kinds of *F3'5'H* polymorphic genes, *EgHf 1*, *2* and *3*, were studied in *Eustoma* flowers in which the three kinds of typical petal anthocyanidins (ANCDs) are known to be characterized as pelargonidin (Pg), cyanidin (Cy) and delphinidin (Dp). It has been clarified that the lines which possess *EgHf 1* had the phenotype of Pg, Cy and Dp, thus corresponded with the multiple allele H^O genotype, the *EgHf 2* had only the Dp phenotype which corresponded with H^D genotype and the *EgHf 3* without the synthesis of Dp corresponded with H^T or H^F genotypes. In addition, the overexpression of isolated *Eustoma F3'H* gene (*EgF3'H*) has been tested to alter flower color from red to blue in the *I. nil* cultivar 'Violet', which lacks a functional *F3'H* gene, to demonstrate for the first time that *EgF3'H* functions in the synthesis of cyanidin. Furthermore, the presence of a single gene loci dominant / recessive (*Ans* / *ans*) model for *ANS* gene was confirmed to control anthocyanin accumulation, being independent of *F3'5'H* polymorphic genes.

In addition, the analysis of polymorphic gene of wild *Eustoma* species has revealed that all the wild types had *EgHf 1* even though they accumulated only the Dp pigment, thus their genotype is designated as a proposed allele H^E and all the wild *Eustoma* species have H^EH^E homozygous genotype along with the light purplish flower color. Cross-pollinations with other alleles have been confirmed to know the genotypes and phenotypes relationships; H^OH^E genotype has purplish flower color with only Dp accumulation, H^DH^E and H^TH^E genotypes have purplish flowers with dominant Dp and fewer Cy accumulations.

Secondly, for the inheritance of corrolla trait, a single gene loci dominant / recessive (*B* / *b*) model for expressing the brushed phenotype and a single gene loci dominant / recessive (*E* / *e*) model for expressing the edge-colored phenotype were clarified. Regarding control of the yellow colored flowers, the two kinds of genotypes are newly proposed; a single gene loci dominant / recessive (*Y* / *y*) model for the expression of genes which is predicted to relate the synthesis of carotenoid and a single gene loci dominant / recessive (*C* / *c*) model for the expression of genes which is predicted to relate the degradation of carotenoid.

Thirdly, the inheritance of corolla shapes; double, hose-in-hose and single shapes were studied and multiple alleles were found to control the three kinds of corolla trait; three alleles designated D^D, D^W and D^S in Eustoma flowers, controlling the phenotypes of double (D^DD^D and D^DD^S); hose-in-hose (D^DD^W); and single (D^SD^S, D^WD^W and D^SD^W) flowers (genotypes), thus suggesting that the allele D^W origins from the wild *Eustoma* species.

Finally, according to the Eustoma genotype in this thesis, the 15 F_1 lines were produced. As the result for confirming the individual genotypes and phenotypes of parental lines as well as all the produced F_1 lines, the flower shapes, expression of ANCDs as well as their petal proportions, brushed, edge-colored phenotypes in association with expressing the yellow colors, were in consistent with the proposed genotype in this thesis, thus demonstrating to make the targeted Eustoma F_1 cultivars based on the proposed genotype D^XD^X・*B*/*b*・*E*/*e*・H^XH^X・*Pg*/*pg*・*Y*/*y*・*C*/*c*.