Abstract

Strawberry is a highly efficient and economical horticultural crop plant, and strawberry fruits are easy to soften after ripening and decay after harvest, which severely impacts the economic benefits. Expansins are plant cell-wall loosening proteins involved in the process of fruit softening, loosening cell walls and reducing fruit firmness. In this study, 35 FvEXPs genes were identified in the F. vesca genome. These genes were divided into four subfamilies (27 FvEXPAs, 5 FvEXPBs, 1 FvEXLAs, and 2 FvEXLBs) are unevenly distribute on 7 chromosomes. Gene structure and motif analysis showed the conserved structure and motif in same subfamily and subgroup, however, the different motifs and structures may reveal functional divergence of multigene family members of FvEXPs in different tissues and developmental stages. The expression profiling by RNA-seq and qRT-PCR analysis revealed that the expansin genes have distinct expression patterns among different stages of strawberry development and ripening. Among them, 3 genes (FvEXPA9, FvEXPA12, and FvEXPA27) were highly expressed in the ripening stage, FvEXPA9 and FvEXPA12 were especially highly expressed in turning stage, whereas FvEXPA27 was especially highly expressed in red stage. Our study provides a better understanding of the FvEXP genes, which may benefit strawberry biotechnological breeding for extending storage life and improving storage quality.


2. Gene Structure and Conserved Motif Analysis of FvEXPs.

3. Chromosomal Location and Syntenic Relationships of FvEXPs

4. Expression Profiles of FvEXPs in Different Development and Ripening Stages of Strawberry Fruits

5. Promoters and Interaction Analysis of Three FvEXPs

Conclusions

Our findings provide new insights into the characteristics and potential functions of FvEXPs. Three FvEXP genes should be further studied as they appear to be excellent candidates for fruit development and softening of strawberry. And their functional differentiation may be regulated by the corresponding cis-acting elements contained within them, which will also be further studied.

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