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Analysis of Flowering Times and Expression of Flowering Genes in Soybean Grown at High Temperature Conditions

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[Introduction]

In the reality that the cultivation environment of crops is changing rapidly, such as drought, salinity and high temperature caused by global warming, we have tested the effect of the climate change on plant growth, development, and reproduction. In this study, we investigated the effects of high temperature conditions on the growth and flowering time of soybean and analyzed the expression patterns of soybean flowering genes, including *GmGLs*, *GmFTs*, and *GmCOLs*.

[Materials and Methods]

Flowering time and growth characteristics were investigated in Williams 82, early maturing cultivar, and IT153414, medium-maturing cultivar, grown at normal atmospheric temperature conditions (normal field) and high temperature conditions (atmospheric temperature +3°C, Climatron). Reverse transcription-polymerase chain reaction (RT-PCR) was used to analyze the expression of soybean flowering genes.

[Results and Discussions]

To investigate the effects of rising temperature on the expression of soybean flowering genes, including *GmGLs*, *GmFTs*, and *GmCOLs*, we analyzed mRNA levels of those genes in the leaves of soybean accessions grown in normal field conditions and high temperature conditions. RT-PCR analysis revealed that soybean flowering genes exhibited different expression patterns in response to elevated temperature conditions. Moreover, higher temperature also differentially affects growth, flowering time, and productivity of two soybean accessions, Williams 82 and IT153414. First of all, higher temperature accelerated flowering of both soybean accessions. In early flowering accession, Williams 82, the plant length of was increased, but the yields composed by the number of pods and seeds tended to decrease. In medium flowering IT-153414 accession, the numbers of pod were reduced, but the seed numbers were increased at higher temperature conditions. The results indicated that higher temperature had worse effect on the yields of early flowering accession than that of medium flowering accession. Our results provide valuable information for breeding soybean cultivars suitable for changing climate conditions.

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